Applied·Measurement·Science
Consultants in Quantitative Process and Environmental Measurements

Final Report

Methyl Bromide Ambient Air Monitoring in Oxnard/Camarillo and Santa Maria August-October, 2001

Prepared for:

Alliance of the Methyl Bromide Industry
c/o William J. Thomas
Livingston & Mattesich Law Corporation
1201 K Street, Suite 1100
Sacramento, CA 95814-3938

Submitted to:

Department of Pesticide Regulation
California Environmental Protection Agency
1001 I Street
Sacramento, CA 95814

Prepared by:

Eric D. Winegar, Ph.D., QEP
Applied Measurement Science
9218 Rock Oak Lane
PO Box 5339
Fair Oaks, CA 95628

April 4, 2002

INTRODUCTION

The purpose of this report is to present the final results of ambient air monitoring in August to October, 2001 conducted on behalf of the Alliance of the Methyl Bromide Industry (AMBI, a group of methyl bromide registrants) at the behest of the California Department of Pesticide Regulation (CDPR). The purpose of the monitoring was to obtain ambient air concentrations of methyl bromide in the Oxnard/Camarillo and Santa Maria areas during times of high usage for the intention of exposure assessment for the communities surrounding the areas of fumigation activities.

The study director was Dr. Eric Winegar of Applied Measurement Science. Field crews consisted of Joel Winegar of Applied Measurement Science, Marcie Shove of Diamond Resources, Inc, and Chad Ellis of Diamond Resources, Inc. All laboratory analyses were conducted by Environmental Analytical Service (EAS) in San Luis Obispo, California under the direction of Dr. Steve Hoyt.

Versions of Report

This report was prepared in two phases. The first phase was submitted to CDPR on February 15, 2002, and presented the ambient concentrations without any comparison to meteorological conditions or methyl bromide usage. The final version of the report contained in this document includes the comparisons mentioned above. However, two other data sets remain unavailable--1) interlaboratory spike sample comparison data between EAS and the California Air Resources laboratory, and 2) side by side sampling data for both Oxnard/Camarillo and Santa Maria. These data points should not affect the overall conclusions of the study, but assist in meeting the quality assurance goals of comparability and interlaboratory accuracy comparisons.

Study Design

The study was intended to collect sets of weekly ambient air concentrations of methyl bromide at sites that would be representative of exposure to the community during fumigation activities. The study design was intended to utilize three main factors for understanding ambient air dispersal of methyl bromide during fumigation activities: source strength (fumigation usage rates and locations), receptor impact (ambient air concentrations as measured during the study period), and the transport mechanism (meteorological conditions).

In order to obtain this information, it required sampling site selection that was balanced among several factors: vicinity to centers of population, a reasonable distance away from other fumigation activities or potential emission sources, meeting the specific sampling site criteria, and permission from the site owners. Final sampling site selections were made after consultation with CDPR.

The work plan to guide the study was prepared in accordance with the proposed protocol suggested by CDPR, reviewed by the AMBI group and then finalized and submitted to CDPR. Any substantive changes to the work plan were incorporated in later revisions that were also submitted to CDPR. Any modifications to the sampling schedule due to changing circumstances

were communicated to CDPR immediately. There were a total of three revisions of the work plan prepared from July, 2001 to September, 2001. The final work plan is appended to this document for reference.

The time line for inception of the project and various versions of the work plan were submitted on the following dates:

- Re-evaluation Notice: June 26, 2001
- Selection of contractor: Mid-July, 2001
- Site selection: July 25-Aug. 6, 2001
- Preliminary Version 0.5: July 30
- July-September: Continuous updates via email and direct communication
- Work Plan Version 1.0: Aug 5, 2001
- Review with CDPR: Aug. 6, 2001
- Letter from CDPR: Aug. 17, 2001
- Work Plan Version 2.0: Sept. 6, 2001
- Work Plan Version 3.0: Sept. 23, 2001

Sampling Locations

Sampling locations were selected based on the CDPR site selection criteria along with standard sampling guidelines. A large number of sites were screened and evaluated before selecting the best candidates and obtaining permission. In two cases, this process was hindered by difficulty in getting permission, which resulted in not being able to collect samples during a one to 10 day period. In other cases, a preliminary site was rejected due to the determination that active fumigations were occurring or would occur within a short distance (less than 200 yards) from the proposed sampling site. In this case, alternative sites were sought and eventually selected so that the sites would be representative of ambient concentrations and not source-impacted.

The sampling sites listed below represent the final selection of sites following review by CDPR.

<u>Oxnard/Camarillo Sampling Locations</u>

1. Sharps Automotive (SHA)

   Rationale: Adjacent to both agricultural and population centers, good access, single story building, building owners cooperative. This location is adjacent to both residential areas on the west, north, and northeast. To the east are agricultural and sparse industrial areas.

2. Abandoned Building (ABD) on Vineyard and Escalande Roads

   Rationale: Adjacent to business and residential area.

3. United Water Conservation District (UWC) pump station, NW of airport.

   Rationale: Between Camarillo/Oxnard population centers, near agricultural/fumigation areas.

4. Pleasant Valley Water (PVW) District pump station

   Rationale: Middle of agricultural area, in targeted township, downwind of background sources.

Table 1. Oxnard/Camarillo Sampling Locations

Oxnard/Camarillo Area			Coordinates	
Map Site Code	**Name**	**Location**	**Latitude**	**Longitude**
SHA	Sharps Automotive	Saviers/Hueneme	34° 08.886	119° 10.694
ABD	Abandoned Building	Vineyard/Escalande	34° 13.824	119° 10.483
UWC	United Water Cons. District #2	Near Airport - NW	34° 13.003	119° 06.683
PVW	Pleasant Valley Water	Los Posas/Rt. 34	34° 11.818	119° 04.162

Table 1-A. Details of Sampling Sites

Name	Site Details
Sharps Automotive	Top of roof of 1 story building—ht approx. 20 ft.AGL
Abandoned Building	Top of roof of 1 story building—ht approx. 15 ft.AGL
United Water Cons. District #2	Tripod on ground—ht approx. 8 ft. AGL
Pleasant Valley Water	Top of pump bldg—ht approx. 14 ft AGL

AGL=above ground level

Figure 1. Oxnard/Camarillo Area Sites

Santa Maria Sampling Locations

Table 2 contains a list of the four Santa Maria sites investigated and selected. Figure 2 shows a map of the site locations.

1. Plantell Greenhouse (PNT)

   Rationale: near agricultural areas, downwind of fumigations

2. Edward Community Center (EDW)

   Rationale: Adjacent to both population and agricultural centers.

3. Agricultural Commissioners Office (AGC)

   Rationale: Close to population and agricultural centers, public building, one story building

4. Blosser Road (BLO)

   Rationale: Adjacent to population areas. Downwind of background sources.

Background Sampling Location

A field adjacent to the laboratory in San Luis Obispo was selected for the control or background sampling site. The latitude and longitude coordinates are: N35° 14.755 W120° 40.237. This site was deemed appropriate due to its proximity to small urban areas and its isolation from major fumigation activities. Methyl bromide usage rates for the county were evaluated to determine the potential for fumigation occurring One sample per day was collected for every day of standard field sampling. The background samples were handled and analyzed in an identical fashion as the regular field samples.

Table 2. Santa Maria Sites

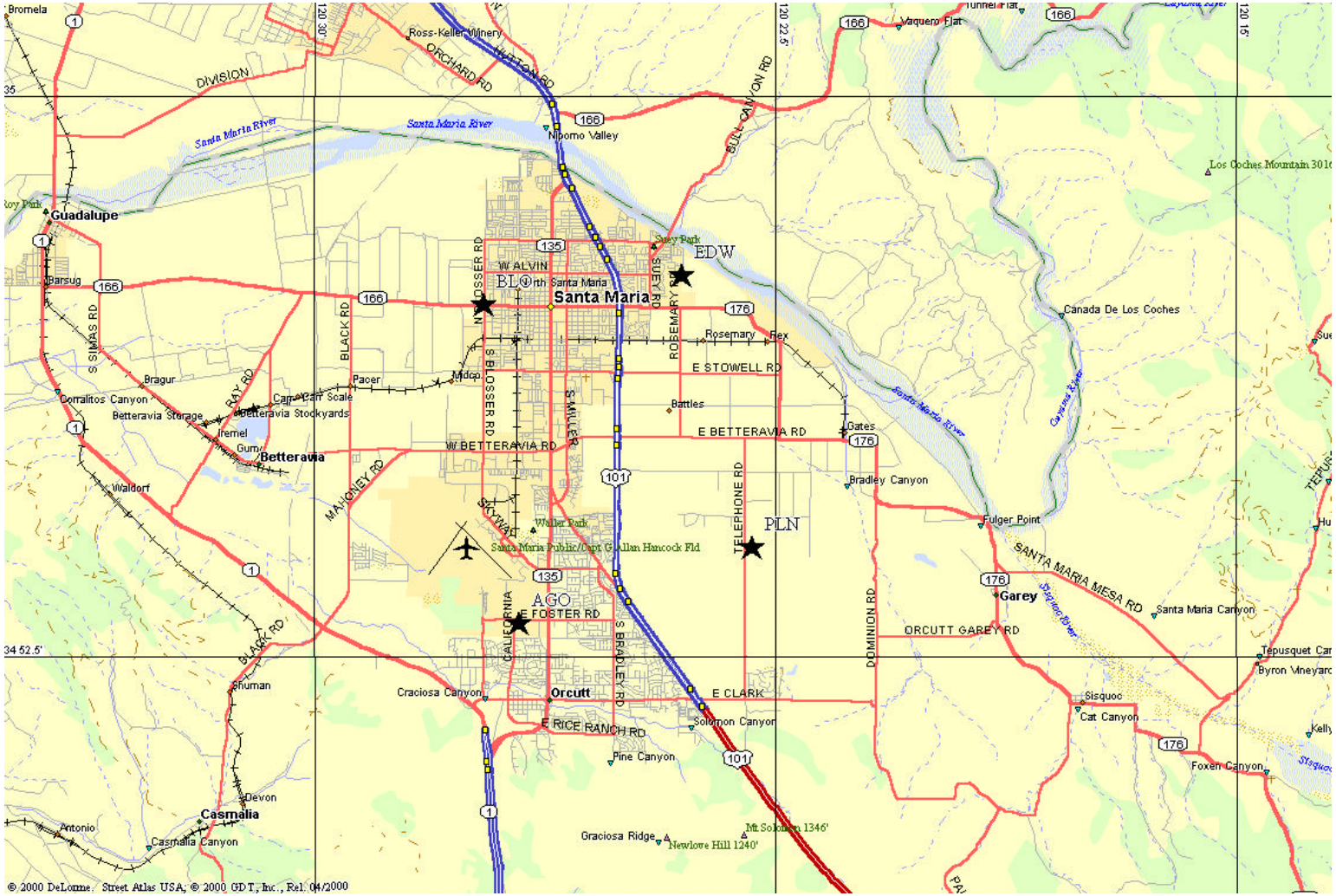
Santa Maria Area			Coordinates	
Map Site Code	**Name**	**Location**	**Latitude**	**Longitude**
PLN	Plantell - Greenhouse, etc.	Telephone Road	34° 53.970	120° 22.893
EDW	Edward Community Center -	Fremont St.	34° 57.620	120° 24.027
AGC	Agricultural Comm. Office/ UC Coop. Ext.	624 Foster Rd./ California St.	34° 52.953	120° 26.671
BLO	Blosser Road	Corner of Blosser and Main St.	34° 57.229	120° 27.253

Table 2-A. Details of Sampling Sites

Name	**Site Details**
Plantell - Greenhouse, etc.	Attached to fence—ht approx. 12 ft. AGL
Edward Community Center	Attached to fence—ht approx. 12 ft. AGL
Agricultural Comm. Office/ UC Coop. Ext.	Top of building—ht approx. 15 ft. AGL
Blosser Road	Top of shed—ht approx. 12 ft. AGL

AGL=above ground level

Figure 2. Santa Maria Sites



MATERIALS AND METHODS

Detailed descriptions of the sampling and analytical methods were presented in the various versions of the work plan, with the final version dated September 23, 2001. Summaries are presented below along with any relevant discussion of field data relating to equipment operation.

Sampling and Analysis Methods

Sampling was conducted with Summa canisters, stainless steel flow controllers, and stainless steel inlets. Sampling was conducted for 24 hour periods, with start times varying for each four-day sampling period and for each sampler. Due to the distance between each of the sampling locations and the transit and set up times, the start and stop times of the four locations were not the same, but were as close as possible. The circuit to start all four sampling locations required between one and two hours, so the majority of sampling start and end times were within a two hour period.

Sampling canisters were located on rooftops at the selected sampling locations. The canister was placed on a tripod holding the micrometeorological monitoring station at each site. The inlet for the sampling line was at a height of approximately 6 feet above the surface of the roof-top or other surface where the tripod was placed. Figure 3 shows an example placement on the roof of the Sharps Automotive location in Oxnard (SHA).

The beginning vacuum in the canister was –29.95 to –27 in Hg, which are considered commonly acceptable limits in the sampling community. The flow rate was set to fill the canister from the nominal –29.95 inches of Hg to approximately –5-8 inches of Hg, corresponding to a flow rate of approximately 3 mL/min. The target volume was 4 liters of sample. The inlet was fashioned from ¼ inch OD 304 stainless steel with the tip curved downward to prevent entry of rain. A 7 micron stainless steel frit filter was inserted in the sampling line before the flow controller.

A Veriflo flow controller or the equivalent was used to control the flow into the canisters. Flow controllers were calibrated on a daily basis. After initially cleaning the flow controllers as noted in the work plan, a decision was made to terminate this activity, which was determined to not add any value to the sampling effort and required a considerable extra effort in equipment maintenance.

Flow rates were measured at the start and end of each sampling period, and several times in between to ensure correct continuing flow. Flow was measured with a J&W ADM-3000 digital flow meter, NIST certified and accurate to ±3%. Deviations to the expected flow of ±50% were allowed before disqualifying the sample, with some additional judgment allowed for individual sample validation, such as a duplicate sample with valid flow rates and a similar concentration, or an ending vacuum indicating a correctly integrated sample. Vacuum gauges were integrated with the inlet system so that the pressure in addition to flow was monitored without removing the inlet.

A number of samples were invalidated due to flow controller difficulties. Operator error was a minor aspect as the flow controllers used for canister sampling are known to be unpredictable in field use. The reason for the difficulties is that exterior of the unit is a large mass of stainless steel, with a vibration and temperature sensitive thin internal diaphragm component that controls the flow. Care was taken to check the flow at the start of sampling and after approximately 30 minutes—the time seen generally to ensure that continuous constant flow is achieved, but this did not always produce the expected result.

Consequently, there were a number of days in which the flow increased at some point during the sampling period, resulting in a canister at atmospheric pressure at the end of the 24 hours. This kind of sample is deemed non-representative because one does not know at what time the sampler collected mo
st of its sample. Although there are ways to adjust for these errors, exclusion is the most common action taken.

Following collection, individual samples were labeled with notation encoding the sampling location and date. The sample tag included type of sample information, project information (client, etc), and field technician name. Chain of custody forms were prepared for each batch of canisters sent to the laboratory.

Figure 3. Sampler and micromet set up at SHA rooftop site.

Samples were stored at ambient temperature until analysis, which typically was less than one week after sample collection. Stability of the collected sampled was not considered a problem due to the large amount of documentation in the literature regarding the stability of methyl bromide and other similar toxic compounds for periods of at least two weeks or more.[1,2,3]

Detailed notes on the start and end times, start and ending pressures, and flow rate measurements are included in the appendix.

Laboratory Analysis

Laboratory analysis was conducted at Environmental Analytical Service (EAS) in San Luis Obispo, California, using Modified EPA Compendium Method TO-14A. This method uses a cryogenic preconcentration of an aliquot of the field sample, with subsequent desorption into the gas chromatograph column and detection by mass spectrometry with selected ion monitoring (SIM). Specific method details relating to the performance of the laboratory analysis were detailed in the work plan. It should be noted that this analysis utilized the stable isotope dilution technique to provide accurate results. This modified method is more sophisticated than the usual method of quantitation and provides for a determination of matrix effects to the target compound. EAS is an experienced practitioner of this technique which is unusual for standard air analysis.

A method detection limited study was performed using the standard EPA method for determining method detection limits. A standard at concentration of 0.0102 ppbv was analyzed seven times to yield a standard deviation of 0.00016, which was multiplied times 3.14 to provide the method detection limit of 0.0005 ppbv. This detection limit could be considered the instrument detection limit, so the laboratory applied an adjustment factor of six to give a method detection limit (MDL) of 0.003 ppbv and an estimated quantitation limit (EQL) of three times the MDL of 0.009 ppbv. All data above the MDL was reported and used in statistical calculations. All data above the MDL were reported by the laboratory and were used in data calculations (except for data rejected due to specific QA issues). No field samples were below the MDL.

Field and trip spikes were prepared from laboratory standard into a canister and pressured to 1000 torr to achieve a final concentration of 0.125 ppbv. Field spikes were prepared by sampling two canisters side by side in the same fashion as duplicate samples. One of these two samples was then spiked using a gas-tight syringe with 10 mL of the laboratory standard prior to pressurization. Initially, the field spike was performed in the field, but it was seen that this exercise was more a way to assess the skill of the field technician in the spiking technique than in assessing canister capability, as will be shown below. Therefore, this approach was discontinued in favor of performing the spike in the laboratory after field sampling. The field spike was assessed by comparing the spiked canister to the unspiked canister and calculating a recovery. The trip spike was prepared by injecting 10 mL of the laboratory standard and pressurizing the canister prior to shipping in the field. After receipt at the laboratory, it was analyzed as a normal field sample.

Meteorological Data Collection

Two types of meteorological monitoring were conducted during the program. First, each sampling site had a site-specific micrometeorological station to collect wind speed, wind direction, and temperature. These stations will be termed "micrometeorological stations." These stations were a Spectrum Technologies, Inc. Model 525 weather station, which measured wind speed, wind direction, and temperature. The station was at the same height and location as each canister sampler so that specific site micro-conditions could be recorded. Wind data was recorded at 5 minute intervals and downloaded weekly with each sample set. Some gaps in individual station records exist due to downloading problems.

The second meteorological monitoring station was located at a central location and was used for general regional conditions. This system is identified as the "main meteorological station." This system was a Novalynx WS-16 system which measured wind speed, wind direction, temperature, relative humidity, and barometric pressure. The main sensor set (wind speed and direction) were NIST certified and met PSD performance specifications. Data was recorded as 15 minute averages for the duration of the program. In Oxnard/Camarillo, the main met station was located at the UVW site, on top of a pump building, at a height of approximately 8 meters. In Santa Maria, the main met station was situated at the BLO site, at a height of approximately 5 meters.

The meteorological data for each site will be discussed below in conjunction with the examination of the data. Due to its length (108 pages for each of the two stations), the full "main" meteorological station data will be made available electronically.

Sampling Schedule

The sampling schedule in the protocol specified sampling four days per week for eight weeks. Various site conditions and other circumstances affected the sampling schedule, but the protocol sampling schedule was largely followed. In one case—the first week of sampling at Oxnard/Camarillo—due to equipment and other logistical concerns, only three days of sampling was conducted. The following week, the lost day was made up for with five continuous days of sampling. In all other cases, the planned 4-day sampling period was followed. In the event of any changes to the schedule, DPR was notified immediately. Following this breakdown in sampling schedule, the data tables in the Results section are split into weekly and site specific sections.

Supplementary Full Scan GC/MS Analysis

As a supplement to the regular field sample analysis, a subset of the regular samples was re-analyzed in full scan GC/MS mode. The re-analysis was performed after the regular analysis was completed. This was performed on approximately one sample per week, on average, for a total of 19 samples between the two areas. In addition, another set of week-long integrated samples using a 168 hour Entech flow controller was attempted but terminated after 48 hours due to failure of the flow controller to correctly control the flow

to the desired rate. It was decided not to terminate this attempted sampling and to continue the weekly re-analysis.

External Comparison Samples

Two types of external comparison samples were collected. Side by side sampling with CDPR personnel was performed for two days at both Oxnard/Camarillo and Santa Maria. In addition, spiked canister samples were prepared by both the CARB Monitoring and Laboratory Division and EAS, and exchanged for analysis. The results of both these tests have not been released and cannot be evaluated at this time.

Excluded Periods

As discussed in the September 23, 2001 final version of the work plan, a sampling site was to be excluded from sample collection if a fumigation occurred within 1200 feet of the sampling site. This criterion was based on the CDPR exclusion zones (i.e., buffer zones) for field fumigations. The purpose was to ensure that non-representative source-impacted samples were not collected as they would not be true ambient air samples and would compromise the study validity.

This condition occurred twice at the UWC site in Oxnard, when nearby fields were undergoing fumigation. On September 6 to 9, fumigant application occurred approximately 50 feet from the sampling site. On September 27 to 30, a fumigation occurred less than 300 yards from the sampling site. In accordance with the study work plan, no samples were collected in either instance, so as not to contaminate the study with nonrepresentative and so no data would have to be qualified on the basis of being impacted by nearby fumigations.

RESULTS AND DISCUSSION

Description of Data Set/Data Completeness

Completeness is described in two ways: the ratio of valid data points to total planned samples[4], or the ratio of valid data points to total samples collected. Both calculations were performed on the data sets from Oxnard/Camarillo and Santa Maria, and for the total program. Table 3A contains the results of this accounting. Samples were declared invalid and not usable for a variety of causes:

- Lost—the sample was collected but subsequently lost in the field or laboratory. This happened on three occasions; no reason has been found for the losses. In one case, the canister disappeared for several weeks, with concern coming from the lab due to lost assets, but evidently was found later as the canister number reappeared in subsequent samples. It is believed that the canister sample ID tag was lost, and without any other identification means, was recycled for use in subsequent sampling. No definitive explanation was found for any of the lost samples.

- Shipping—sampling media missed expected arrival time, and there was not sufficient time to obtain replacement media for that day. This occurred in one instance on September 18, shortly after the shipping disruptions of September, 2001. It was not clear how much was due to the shipping disruptions and how much was due to a communication mishap between the field and the laboratory.

- Flow deviations. Flow deviations were due to the Veriflow flow controller deviating from the set and checked flow. The standard operating procedure was to calibrate the flow controller prior to sampling, check it immediately upon start of sampling, wait 10-15 minutes and check again to ensure correct flow continued. This was after the last flow check from the previous sample, so several checks had been completed. Regardless of these checks, failures occurred, resulting in too rapid sample collection, ending at atmospheric pressure. A total of 20 flow deviations occurred that invalidated final data. Several other instances of flow deviation occurred on duplicate samples, but in those cases only the duplicate sample was invalidated and the primary sample was validated for use. In those cases, only the primary sample was used for any calculation.

- Fumigation. Since the purpose of the monitoring was to collect ambient air samples, this meant that any samples known to be impacted by nearby fumigations would be not collected or if collected would be invalidated. This occurred on two occasions at the PVW site, as discussed above. Other comparisons with fumigated areas and the remainder of the data set are discussed below.

- Permission. There were two instances in which permission for the use of a sampling site was sought but not obtained until after the start of the monitoring

period. In the case of ABD in Oxnard/Camarillo, several sites had been sought unsuccessfully. First, a site had been selected and permission obtained until it was found that fumigation was to occur in the field adjacent to the monitoring site. Therefore, that site was rejected. Several other sites were inquired into, but no permission could be obtained due to the nature of the buildings (to meet siting criteria) and businesses in the area. A site was found that did meet the sampling criteria, but permission was difficult to obtain due to having to work with an absentee landlord and his attorney. Permission was finally obtained, but only after 10 sampling days were lost, from August 15 to August 31. In a second case, the expected arrival of the manager at the PNT site in Santa Maria was delayed by a day, so his permission was not obtained until the start of the second day of sampling at that site.

The completeness data in Table 3A show a reasonable degree of completeness when compared with standard regulatory guidance and with similar monitoring programs. The Federal Reference Methods cited in 40 CFR Part 50 for air quality monitoring all cite a 75% completeness criterion, both in spatial and time averages. The USEPA Air Toxics Monitoring Program also cites a 75% completeness criterion.[5]

An examination of the California Department of Pesticide Regulation methyl bromide monitoring program conducted by the California Air Resources Board during 2000 in Kern, Monterey, and Santa Cruz counties shows that from a total of 474 samples, 41 were lost to flow deviations, and 47 to other unspecified reasons.[6] The completeness rate for that program was 81.4%. Therefore, the present program with a completeness rate of 94% is consistent with federal guidelines and similar monitoring programs.

Table 3A. Completeness

Oxnard/Camarillo	**PVW**	**UWC**	**SHA**	**ABD**	**Total**	**Planned Samples***	**Completeness**
Valid Samples	31	19	29	21	100	120	83.3%
Collected samples	33	25	32	23	113	128	88.3%
Invalidated samples							
Permission	0	0	0	10	10		
Lost	0	0	2	1	3		
Shipping	1	1	1	1	4		
Fumigation	0	8	0	0	8		
Flow	1	5	1	0	7		
***Per work plan**							
Santa Maria	BLO	AGC	EDW	PNT	Total	Planned Samples*	Completeness
Valid Samples	31	28	30	25	114	128	89.1%
Collected samples	32	32	32	31	127	128	99.2%
Invalida ted samples							
Permission	0	0	0	1	1		
Lost	0	0	0	0	0		
Shipping	0	0	0	0	0		
Fumigation	0	0	0	0	0		
Flow	1	4	2	6	13		
***Per work plan**							
					Total Valid	**Total Planned***	**Completeness**
Overall					214	248	94.0%
***Per work plan**							

Table 3B contains the tabulation of quality assurance samples collected for the program. The number of QA samples met or exceeded the requirements set forth in the work plan. An assessment of the results of these samples is included in the discussion on data validation below.

Table 3B. Quality Assurance Samples

	PVW	UWC	SHA	ABD	Total
Field Duplicates	3	2	2	2	9
Lab Duplicates	6	2	4	4	16
Full Scan	3	1	3	2	9
Trip Spikes					4
Trip Blanks					5
Field Spikes					6
	BLO	**AGC**	**EDW**	**PNT**	**Total**
Field Duplicates	2	2	2	3	9
Lab Duplicates	1	9	1	7	18
Full Scan	2	0	3	3	8
Trip Spikes					3
Trip Blanks					7
Field Spikes					4

Comparability

Another of the key quality assurance data indicators is comparability—has the data been collected in a manner suitable for comparison with other similar data sets? This requires the use of commonly accepted sampling and analytical methods, along with acceptable data reduction techniques.

For this study, the use of agency-approved methods that have many years of industrial, research, and governmental use, satisfies the requirement that the methods be standard. All methods have been thoroughly vetted through many similar programs, so it can safely be said that the data set achieves comparability.

Representativeness

The final QA parameter to be examined is representativeness—that is, does the data set satisfy the data demands to answer the questions at hand. While the discussions of precision and accuracy address meeting the measurement objectives, the issue of representativeness can best be addressed in the context of decision data objectives and data interpretation. Therefore, a more complete review of the question of whether this data set meets the study objectives will be discussed along with interpretation of all the data sets.

Data Validation

Before any statistical or other evaluation of the data occurred, the entire set of field and laboratory quality assurance data was reviewed to determine the set of data that would be usable for final interpretations. This was performed in the following steps:

- Sampling precision was assessed through the average of field duplicates samples. Precision of field duplicates was calculated by using the relative standard deviation in percent (RPD), from the following equation: RPD = 100% *(difference between the two values)/(average of the two values).

  The average sampling precision was determined to be 25.5% for Oxnard/Camarillo, and 21.9% for Santa Maria. These values are well below the commonly accepted level of 50% for sampling precision, and within typical performance levels for federal and private programs for sampling precision.[7,8] One duplicate sample pair at SHA on September 20 was exceedingly high (RPD of 122.2%). This is probably due to the flow ending flow rate in the duplicate sample.

  Laboratory precision was assessed through the average of laboratory replicates. Precision of laboratory replicates was calculated by using the relative standard deviation in percent (RPD), from the following equation: RPD = 100% *(difference between the two values)/(average of the two values).

  The average precision for the laboratory replicates for the Oxnard/Camarillo data set was 11.4%, and the precision for the Santa Maria data set was 8.2%. Both of these are well below the accepted level of 30% for laboratory precision, as indicated in the method,[9] and typical of federal and private laboratory precision.[1,2]

  Final sample concentration was calculated from the average of the field duplicate result for each sample and laboratory replicate for each sample. In the case of nested values of field duplicates and laboratory replicates, these were averaged to yield the final concentration. These values are represented in the full data tables below.

- Total precision was estimated based on field and laboratory replicates.

  Since the field duplicates are a measure of total precision, including laboratory precision, and the laboratory precision is less, as expected, than the field precision, the estimate of total precision is a rough average of the two sets of data. It is estimated that the total precision would be on the order of ±30%. As indicated above, this level of total precision is consistent with other federal and private monitoring programs.

- Laboratory contamination was evaluated through method blanks.

  Of a total of 42 laboratory blanks, all were at or below the method detection limit of 0.003 ppbv. No table is included since all the values were identical. At least one blank per day of analysis was performed. None was above the quantitation limit of 0.009 ppbv. One can check sample (not a normal instrument blank) had 0.006 ppbv. Therefore, the potential for laboratory contamination was found to

be low or non-existent. Neither the calibration nor quantitation of field samples was affected by any laboratory contamination issues. The detectability of methyl bromide at low levels was also not affected by any blank contamination issues.

- Contamination potential from sample handling through examination of trip blanks.

  The trip blank data, as shown in Table 4, indicate that the average concentration was 0.010 ppbv, which is only 0.001 ppbv above the estimated quantitation limit. The standard criterion for judging contamination is based on a factor five times the detection limit,[10] or 0.015 ppbv. No blank was at or above that level, and the lowest field sample was 0.017 ppbv. It was concluded that the potential for contamination of the field samples from the sampling media or sample handling was low.

Table 4. Trip Blank Data.

DATE	Result (ppbv)
26-Aug-01	0.008
31-Aug-01	0.008
7-Sep-01	0.008
13-Sep-01	0.003
14-Sep-01	0.009
17-Sep-01	0.011
18-Sep-01	0.034
19-Sep-01	0.010
27-Sep-01	0.008
3-Oct-01	0.008
7-Oct-01	0.008
9-Oct-01	0.008
Ave	0.010
Count	12

- Laboratory accuracy was evaluated from method spikes.

  A total of 41 method spikes averaged 120.6% recovery, with a very narrow spread of values. The spike concentration was 0.102 ppbv, in the same range as a majority of the field samples. Although this level of accuracy is within the standard ±30% accuracy limits, this consistent performance, along with the results of the trip spikes below, suggest a possible positive bias of up to 20%.

- Trip and field spikes were examined to assess the canister sampler performance.

  The eight trip spikes averaged a recovery of 122.2%. Combined with the method spikes, this consistent recovery suggests both an absence of any losses from the canister (which has been amply demonstrated in many other field studies)[1] and the possible positive bias on the order of 20%. No data will be adjusted for this observation, but this factor should be kept in mind in evaluating this data set in comparison with other data sets. The remaining external quality assurance data

will be helpful in completely evaluating and determining any potential bias in these data sets.

The results from the field spikes were mixed, but for reasons other than performance of the canister or any effects from the matrix. The following table contains the results of the field spikes:

Site/Date	Recovery	Notes
UWC0831	316%	Reject
PVW0831	64%	Reject
AGC0829	600%	Reject
SHA08025	128%	See note in text.
ABD0908	Failed	Reject
BLO0911	109%	Start of lab spiking
PNT0924	95.2%	Lab spiking
PVW0920	85.9%	Lab spiking
EDW1006	83%	Lab spiking
SHA1010	97.0%	Lab spiking

These results show primarily the skill level of the person performing the spike. Given that field spikes are rarely performed in routine monitoring, the net effect is to evaluate the spiking technique of the technician and not that of the sampling media or effects of the matrix. The spiking procedure using gas-tight syringes, etc is more in the province of a laboratory procedure, not a field procedure, and as such most field technicians are not experienced. This can be seen by the failures of technicians from both Oxnard/Camarillo and Santa Maria.

All samples prior to September 11 were spiked in the field, and all except for one failed badly due to the level of expertise of the field technicians. The magnitude of the failure suggests that it was due to poor technique and not any other phenomenon. The spike performed on Aug 25 was done by the experienced project manager, not the field technician, which explains the adequate result.

The literature is replete with data on stability of methyl bromide and similar compounds in ambient air, so the spiking exercise did little to enhance the quality of the data. The successful spikes averaged 99.7% recovery.

- Adjustment of Data. No data was adjusted for recovery or other factors.
- Field notes were evaluated for flow performance or other factors.

  As discussed above, the flow controllers contributed to a number of sample difficulties, resulting in invalidating 20 samples on the basis of flow variations. The final validated data set is presented in summary Tables 6 -13 below.

Background Data

The background data collected in San Luis Obispo are contained in Table 5. A total of 32 samples was collected during the same time periods as field sampling. The data show that the arithmetic average was 0.084 ppbv, with a high of 1.15 ppbv, and a low of 0.010 ppbv. A plot of the background data is shown in Figure 4.

Table 5. Background Data

BACKGROUND					
DATE	**Day**	**Result**	**LR**	**RPD-LR (%)**	**Final Result (ppbv)**
15-Aug-01	Wed	0.04			0.04
16-Aug-01	Thu	0.03			0.03
17-Aug-01	Fri	0.04			0.04
18-Aug-01	Sat				
19-Aug-01	Sun				
20-Aug-01	Mon				
21-Aug-01	Tue	0.02			0.02
22-Aug-01	Wed	0.02			0.02
23-Aug-01	Thu	0.02			0.02
24-Aug-01	Fri	1.12			1.12
25-Aug-01	Sat				
26-Aug-01	Sun				
27-Aug-01	Mon				
28-Aug-01	Tue	0.04			0.04
29-Aug-01	Wed	0.03			0.03
30-Aug-01	Thu	0.02			0.02
31-Aug-01	Fri	0.02	0.02	5.4%	0.02
1-Sep-01	Sat				
2-Sep-01	Sun				
3-Sep-01	Mon				
4-Sep-01	Tue	0.05			0.05
5-Sep-01	Wed	0.02	0.02	10.0%	0.02
6-Sep-01	Thu	0.45			0.45
7-Sep-01	Fri	0.04			0.04
8-Sep-01	Sat				
9-Sep-01	Sun				
10-Sep-01	Mon				
11-Sep-01	Tue	0.01			0.01
12-Sep-01	Wed	0.03			0.03
13-Sep-01	Thu	0.06			0.06
14-Sep-01	Fri	0.05			0.05
15-Sep-01	Sat				
16-Sep-01	Sun				
17-Sep-01	Mon				
18-Sep-01	Tue	0.04			0.04
19-Sep-01	Wed	0.03			0.03
20-Sep-01	Thu	0.03			0.03
21-Sep-01	Fri	0.04			0.04
22-Sep-01	Sat				
23-Sep-01	Sun				

BACKGROUND					
DATE	**Day**	**Result**	**LR**	**RPD-LR (%)**	**Final Result (ppbv)**
24-Sep-01	Mon				
25-Sep-01	Tue	0.03			0.03
26-Sep-01	Wed	0.03			0.03
27-Sep-01	Thu	0.09			0.09
28-Sep-01	Fri	0.06			0.06
29-Sep-01	Sat				
30-Sep-01	Sun				
1-Oct-01	Mon				
2-Oct-01	Tue	0.06			0.06
3-Oct-01	Wed	0.04			0.04
4-Oct-01	Thu	0.03			0.03
5-Oct-01	Fri	0.04	0.06	24.0%	0.05
6-Oct-01	Sat				
7-Oct-01	Sun				
8-Oct-01	Mon				
9-Oct-01	Tue	0.07			0.07
10-Oct-01	Wed				
Ave.				13.1%	0.084
Count					32

LR=Laboratory Replicate analysis. RPD=Relative Standard Deviation

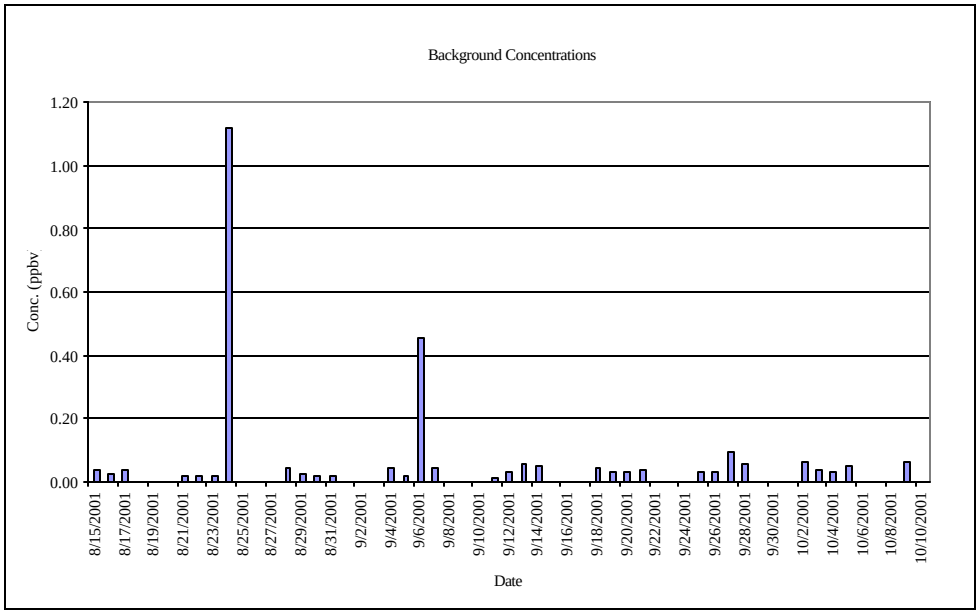


Figure 4. Plot of Background Concentrations

Complete Field Data Set

The complete data sets, including QA samples and comments on sampling or logistics issues, are contained in Tables 6-9, for the four Oxnard/Camarillo sampling sites. Tables 10-13 contain data from the four Santa Maria sampling sites. For the four Oxnard/Camarillo data sets, each table contains the data from the sampling site presented in Table 1 and Figure 1. For the four Santa Maria data sets, each table contains the data from the sampling site presented in Table 2 and Figure 2.

Table 6. Pleasant Valley Water (PVW) Data

Pleasant Valley (PVW)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
15-Aug-01	Wed	1.82					1.82	
16-Aug-01	Thu	1.09	1.01	7.4%			1.05	
17-Aug-01	Fri	3.17					3.17	
18-Aug-01	Sat							
19-Aug-01	Sun							
20-Aug-01	Mon							
21-Aug-01	Tue	0.50					0.50	
22-Aug-01	Wed	1.91					1.91	
23-Aug-01	Thu	2.49					2.49	
24-Aug-01	Fri	1.44					*1.44*	Flow deviation
25-Aug-01	Sat	0.81					0.81	
26-Aug-01	Sun							
27-Aug-01	Mon							
28-Aug-01	Tue	0.12					0.12	
29-Aug-01	Wed	0.15					0.15	
30-Aug-01	Thu	0.28					0.28	
31-Aug-01	Fri	0.16	0.14	14.9%	0.17	5.5%	0.15	
1-Sep-01	Sat							
2-Sep-01	Sun							
3-Sep-01	Mon							
4-Sep-01	Tue							
5-Sep-01	Wed							
6-Sep-01	Thu	0.21	0.19	12.0%			0.20	
7-Sep-01	Fri	0.10					0.10	
8-Sep-01	Sat	0.07					0.07	
9-Sep-01	Sun	0.16					0.16	
10-Sep-01	Mon							
11-Sep-01	Tue							
12-Sep-01	Wed							

Pleasant Valley (PVW)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
13-Sep-01	Thu	0.17					0.17	
14-Sep-01	Fri	0.15					0.15	
15-Sep-01	Sat	0.20					0.20	
16-Sep-01	Sun	0.33	0.25	27.6%			0.29	Full scan: MB=0.65
17-Sep-01	Mon	0.37	0.33	13.7%			0.35	
18-Sep-01	Tue	--					--	Missed-Shipping prob.
19-Sep-01	Wed	0.18					0.18	
20-Sep-01	Thu	0.59					0.59	Full scan: MB =0.33
21-Sep-01	Fri							
22-Sep-01	Sat							
23-Sep-01	Sun							
24-Sep-01	Mon							
25-Sep-01	Tue							
26-Sep-01	Wed	0.17					0.17	
27-Sep-01	Thu	0.08					0.08	
28-Sep-01	Fri	0.07			0.10	41.9%	0.08	
29-Sep-01	Sat	0.13	0.09	30.1%	0.11	11.8%	0.11	
30-Sep-01	Sun	0.15					0.15	
1-Oct-01	Mon							
2-Oct-01	Tue							
3-Oct-01	Wed							
4-Oct-01	Thu							
5-Oct-01	Fri							
6-Oct-01	Sat							
7-Oct-01	Sun	0.06					0.06	
8-Oct-01	Mon	0.05					0.05	
9-Oct-01	Tue	0.09					0.09	
10-Oct-01	Wed	0.10					0.10	Full scan: MB<0.5
Ave				17.6%		19.7%		
Count				6		3	31	

RD means laboratory replicate. FD means field duplicate sample. RPD means relative percent difference. Ppbv means parts per billion by volume. Flow deviation means final canister pressure was too low, or final flow was out of specification. Final values in italics have been qualified for these flow controller problems and are excluded from final calculations. MB means methyl bromide. "<" means less than, or non-detected at the value that follows. Count is the number of each type of sample for this site, and average is the average of the RPD for the type of duplicate or replicate (field or laboratory). Full scan means the results of the separate full scan GC/MS analysis.

Table 7. United Water Conservation (UWC) Data

United Water (UWC)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
15-Aug-01	Wed	2.58					2.58	
16-Aug-01	Thu	1.85					1.85	
17-Aug-01	Fri	1.80					1.80	
18-Aug-01	Sat							
19-Aug-01	Sun							
20-Aug-01	Mon							
21-Aug-01	Tue	1.53					1.53	
22-Aug-01	Wed	0.42	0.49	17.2%			0.45	
23-Aug-01	Thu	4.35					4.35	
24-Aug-01	Fri	2.01					2.01	
25-Aug-01	Sat	0.25					0.25	
26-Aug-01	Sun							
27-Aug-01	Mon							
28-Aug-01	Tue	0.21					0.21	
29-Aug-01	Wed	0.10					0.10	
30-Aug-01	Thu	0.35					0.35	
31-Aug-01	Fri	0.18					0.18	
1-Sep-01	Sat							
2-Sep-01	Sun							
3-Sep-01	Mon							
4-Sep-01	Tue							
5-Sep-01	Wed							
6-Sep-01	Thu						--	Skipped: Nearby fumigation
7-Sep-01	Fri						--	Skipped: Nearby fumigation
8-Sep-01	Sat						--	Skipped: Nearby fumigation
9-Sep-01	Sun						--	Skipped: Nearby fumigation
10-Sep-01	Mon							
11-Sep-01	Tue							
12-Sep-01	Wed							
13-Sep-01	Thu	0.07					*0.07*	Flow deviation
14-Sep-01	Fri	0.05					*0.05*	Flow deviation
15-Sep-01	Sat	0.14					*0.14*	Flow deviation
16-Sep-01	Sun	0.06					*0.06*	Flow deviation
17-Sep-01	Mon	0.07					*0.07*	Flow deviation
18-Sep-01	Tue	--					--	Missed: shipping problem
19-Sep-01	Wed	0.20			0.18	15.8%	0.18	
20-Sep-01	Thu	0.30					0.30	
21-Sep-01	Fri							

United Water (UWC)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
22-Sep-01	Sat							
23-Sep-01	Sun							
24-Sep-01	Mon							
25-Sep-01	Tue							
26-Sep-01	Wed	0.60					0.60	Full scan: MB=0.34
27-Sep-01	Thu						--	Skipped: Nearby fumigation
28-Sep-01	Fri						--	Skipped: Nearby fumigation
29-Sep-01	Sat						--	Skipped: Nearby fumigation
30-Sep-01	Sun						--	Skipped: Nearby fumigation
1-Oct-01	Mon							
2-Oct-01	Tue							
3-Oct-01	Wed							
4-Oct-01	Thu							
5-Oct-01	Fri							
6-Oct-01	Sat							
7-Oct-01	Sun	0.07					0.07	
8-Oct-01	Mon	0.05	0.05	3.8%	0.06	10.7%	0.05	
9-Oct-01	Tue	0.07					0.07	
10-Oct-01	Wed	0.07					0.07	
Ave				10.5%		13.2%		
Count				2		2	19	

RD means laboratory replicate. FD means field duplicate sample. RPD means relative percent difference. Ppbv means parts per billion by volume. Flow deviation means final canister pressure was too low, or final flow was out of specification. Final values in italics have been qualified for these flow controller problems and are excluded from final calculations. MB means methyl bromide. "<" means less than, or non-detected at the value that follows. Count is the number of each type of sample for this site, and average is the average of the RPD for the type of duplicate or replicate (field or laboratory). Full scan means the results of the separate full scan GC/MS analysis.

Table 8. Sharps Auto (SHA) Data

Sharps Auto (SHA)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
15-Aug-01	Wed	0.69					0.69	
16-Aug-01	Thu	0.17					0.17	
17-Aug-01	Fri	0.18					0.18	
18-Aug-01	Sat							
19-Aug-01	Sun							
20-Aug-01	Mon							
21-Aug-01	Tue	0.28					*0.28*	Flow deviation
22-Aug-01	Wed	--					--	Lost sample
23-Aug-01	Thu	2.95	2.93	0.9%			2.94	
24-Aug-01	Fri	2.86			*3.89*		2.86	Duplicate sample—flow deviation Full scan: MB=2.71
25-Aug-01	Sat	1.09					1.09	
26-Aug-01	Sun							
27-Aug-01	Mon							
28-Aug-01	Tue	1.18	0.99	17.7%			1.09	
29-Aug-01	Wed	0.07					0.07	
30-Aug-01	Thu	0.58	0.54	7.1%			0.56	
31-Aug-01	Fri	--					--	Missing data
1-Sep-01	Sat							
2-Sep-01	Sun							
3-Sep-01	Mon							
4-Sep-01	Tue							
5-Sep-01	Wed							
6-Sep-01	Thu	0.04					0.04	
7-Sep-01	Fri	0.03					0.03	
8-Sep-01	Sat	0.05					0.05	
9-Sep-01	Sun	0.23					0.23	
10-Sep-01	Mon							
11-Sep-01	Tue							
12-Sep-01	Wed							
13-Sep-01	Thu	0.38					0.38	
14-Sep-01	Fri	0.07					0.07	
15-Sep-01	Sat	0.13					0.13	
16-Sep-01	Sun	0.11					0.11	
17-Sep-01	Mon	0.13					0.13	
18-Sep-01	Tue	--					--	Missed-Shipping prob.
19-Sep-01	Wed	0.104	0.095	7.1%			0.10	
20-Sep-01	Thu	0.58			*0.14*		0.58	Full scan: MB<0.40. Duplicate sample flow deviation.
21-Sep-01	Fri							
22-Sep-01	Sat							

Sharps Auto (SHA)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
23-Sep-01	Sun							
24-Sep-01	Mon							
25-Sep-01	Tue							
26-Sep-01	Wed	0.45					0.45	
27-Sep-01	Thu	0.09					0.09	
28-Sep-01	Fri	0.10					0.10	
29-Sep-01	Sat	0.19					0.19	
30-Sep-01	Sun	0.07					0.07	
1-Oct-01	Mon							
2-Oct-01	Tue							
3-Oct-01	Wed							
4-Oct-01	Thu							
5-Oct-01	Fri							
6-Oct-01	Sat							
7-Oct-01	Sun	0.10					0.10	Full scan: MB<0.50
8-Oct-01	Mon	0.05					0.05	
9-Oct-01	Tue	0.06			0.07	6.2%	0.07	
10-Oct-01	Wed	0.11					0.11	
Ave				8.2%		52.9%		
Count				4		2	29	

RD means laboratory replicate. FD means field duplicate sample. RPD means relative percent difference. Ppbv means parts per billion by volume. Flow deviation means final canister pressure was too low, or final flow was out of specification. Final values in italics have been qualified for these flow controller problems and are excluded from final calculations. MB means methyl bromide. "<" means less than, or non-detected at the value that follows. Count is the number of each type of sample for this site, and average is the average of the RPD for the type of duplicate or replicate (field or laboratory). Full scan means the results of the separate full scan GC/MS analysis.

Table 9. Abandoned Building (ABD) Data

Abandoned Building (ABD)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
15-Aug-01	Wed							Permission not obtained: other
16-Aug-01	Thu							sites not available.
17-Aug-01	Fri							"
18-Aug-01	Sat							
19-Aug-01	Sun							
20-Aug-01	Mon							
21-Aug-01	Tue							Permission not obtained: other
22-Aug-01	Wed							sites not available.
23-Aug-01	Thu							"
24-Aug-01	Fri							"
25-Aug-01	Sat							"
26-Aug-01	Sun							
27-Aug-01	Mon							
28-Aug-01	Tue							No permission
29-Aug-01	Wed							No permission
30-Aug-01	Thu	0.44					0.44	
31-Aug-01	Fri	--					--	Sample lost
1-Sep-01	Sat							
2-Sep-01	Sun							
3-Sep-01	Mon							
4-Sep-01	Tue							
5-Sep-01	Wed							
6-Sep-01	Thu	0.05					0.05	
7-Sep-01	Fri	0.13					0.13	
8-Sep-01	Sat	0.13					0.13	Full scan of spike: MB=4.64
9-Sep-01	Sun	0.39	0.38	1.6%	0.41	5.3%	0.39	
10-Sep-01	Mon							
11-Sep-01	Tue							
12-Sep-01	Wed							
13-Sep-01	Thu	0.07	0.07	7.2%			0.07	
14-Sep-01	Fri	0.10					0.10	
15-Sep-01	Sat	0.15					0.15	
16-Sep-01	Sun	0.11					0.11	
17-Sep-01	Mon	0.14					0.14	
18-Sep-01	Tue	--					--	Missed-Shipping prob.
19-Sep-01	Wed	0.10					0.10	
20-Sep-01	Thu	0.11					0.11	
21-Sep-01	Fri							
22-Sep-01	Sat							

Abandoned Building (ABD)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
23-Sep-01	Sun							
24-Sep-01	Mon							
25-Sep-01	Tue							
26-Sep-01	Wed	0.25	0.26	6.3%			0.25	
27-Sep-01	Thu	0.12					0.12	
28-Sep-01	Fri	0.15					0.15	
29-Sep-01	Sat	0.19					0.19	
30-Sep-01	Sun	0.06			0.06	5.3%	0.06	
1-Oct-01	Mon							
2-Oct-01	Tue							
3-Oct-01	Wed							
4-Oct-01	Thu							
5-Oct-01	Fri							
6-Oct-01	Sat							
7-Oct-01	Sun	0.04					0.04	
8-Oct-01	Mon	0.06					0.06	
9-Oct-01	Tue	0.11	0.10	7.8%			0.10	
10-Oct-01	Wed	0.11					0.11	Full scan: MB<0.40
Ave				5.7%		5.3%		
Count				4		2	21	

RD means laboratory replicate. FD means field duplicate sample. RPD means relative percent difference. Ppbv means parts per billion by volume. Flow deviation means final canister pressure was too low, or final flow was out of specification. Final values in italics have been qualified for these flow controller problems and are excluded from final calculations. MB means methyl bromide. "<" means less than, or non-detected at the value that follows. Count is the number of each type of sample for this site, and average is the average of the RPD for the type of duplicate or replicate (field or laboratory). Full scan means the results of the separate full scan GC/MS analysis.

Table 10. Blosser (BLO) Data

Blosser (BLO)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
15-Aug-01	Wed							
16-Aug-01	Thu							
17-Aug-01	Fri							
18-Aug-01	Sat							
19-Aug-01	Sun							
20-Aug-01	Mon							
21-Aug-01	Tue							
22-Aug-01	Wed							
23-Aug-01	Thu	0.04					0.04	
24-Aug-01	Fri	0.03					0.03	
25-Aug-01	Sat	0.68					0.68	
26-Aug-01	Sun	3.46					3.46	
27-Aug-01	Mon	2.09					2.09	
28-Aug-01	Tue	0.19					0.19	
29-Aug-01	Wed	0.36			0.32	13.0%	0.34	
30-Aug-01	Thu	0.30					0.30	
31-Aug-01	Fri							
1-Sep-01	Sat							
2-Sep-01	Sun							
3-Sep-01	Mon							
4-Sep-01	Tue	0.07					0.07	
5-Sep-01	Wed	0.17					0.17	
6-Sep-01	Thu	0.21					0.21	
7-Sep-01	Fri	0.11					0.11	
8-Sep-01	Sat							
9-Sep-01	Sun							
10-Sep-01	Mon							
11-Sep-01	Tue	1.47					1.47	Full scan: MB=1.01
12-Sep-01	Wed	1.71					*1.71*	Flow deviation
13-Sep-01	Thu	0.40					0.40	
14-Sep-01	Fri	0.51					0.51	
15-Sep-01	Sat							
16-Sep-01	Sun	0.78					0.78	
17-Sep-01	Mon	0.31					0.31	
18-Sep-01	Tue	0.33					0.33	
19-Sep-01	Wed	0.42					0.42	
20-Sep-01	Thu							
21-Sep-01	Fri							
22-Sep-01	Sat							
23-Sep-01	Sun							

Blosser (BLO)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
24-Sep-01	Mon	2.22					2.22	
25-Sep-01	Tue	1.12					1.12	Full scan: MB=0.92
26-Sep-01	Wed	0.34					0.34	
27-Sep-01	Thu	1.20					1.20	
28-Sep-01	Fri							
29-Sep-01	Sat							
30-Sep-01	Sun	4.55					4.55	
1-Oct-01	Mon	0.23	0.26	9.8%	0.22	4.4%	0.24	
2-Oct-01	Tue	0.52					0.52	
3-Oct-01	Wed	0.24					0.24	
4-Oct-01	Thu							
5-Oct-01	Fri							
6-Oct-01	Sat	0.58					0.58	
7-Oct-01	Sun	0.52					0.52	
8-Oct-01	Mon	0.21					0.21	
9-Oct-01	Tue	1.04					1.04	
10-Oct-01	Wed							
Ave				9.8%		8.7%		
Count				1		2	31	

RD means laboratory replicate. FD means field duplicate sample. RPD means relative percent difference. Ppbv means parts per billion by volume. Flow deviation means final canister pressure was too low, or final flow was out of specification. Final values in italics have been qualified for these flow controller problems and are excluded from final calculations. MB means methyl bromide. "<" means less than, or non-detected at the value that follows. Count is the number of each type of sample for this site, and average is the average of the RPD for the type of duplicate or replicate (field or laboratory). Full scan means the results of the separate full scan GC/MS analysis.

Table 11. Agricultural Commissioners Office (AGC) Data

Ag Commissioner (AGC)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
15-Aug-01	Wed							
16-Aug-01	Thu							
17-Aug-01	Fri							
18-Aug-01	Sat							
19-Aug-01	Sun							
20-Aug-01	Mon							
21-Aug-01	Tue							
22-Aug-01	Wed							
23-Aug-01	Thu	0.03	0.03	12.9%			0.03	
24-Aug-01	Fri	0.13					0.13	
25-Aug-01	Sat	0.11					0.11	
26-Aug-01	Sun	0.13					0.13	
27-Aug-01	Mon	0.14					0.14	
28-Aug-01	Tue	0.06					0.06	
29-Aug-01	Wed	0.02					0.02	
30-Aug-01	Thu	0.06					0.06	
31-Aug-01	Fri							
1-Sep-01	Sat							
2-Sep-01	Sun							
3-Sep-01	Mon							
4-Sep-01	Tue	0.05					0.05	
5-Sep-01	Wed	0.05					0.05	
6-Sep-01	Thu	0.13	0.14	11.2%			0.13	
7-Sep-01	Fri	0.18					*0.18*	Flow deviation
8-Sep-01	Sat							
9-Sep-01	Sun							
10-Sep-01	Mon							
11-Sep-01	Tue	0.15	0.15	5.3%			0.15	
12-Sep-01	Wed	0.21					0.21	
13-Sep-01	Thu	0.21					0.21	
14-Sep-01	Fri	0.20					0.20	
15-Sep-01	Sat							
16-Sep-01	Sun	0.03	0.03	13.3%			*0.03*	Flow deviation
17-Sep-01	Mon	0.14					0.14	
18-Sep-01	Tue	0.37					0.37	
19-Sep-01	Wed	0.30					0.30	
20-Sep-01	Thu							
21-Sep-01	Fri							
22-Sep-01	Sat							
23-Sep-01	Sun							
24-Sep-01	Mon	0.20	0.20	1.0%	0.20	1.5%	0.20	
25-Sep-01	Tue	0.06	0.05	11.1%			*0.05*	Flow deviation
26-Sep-01	Wed	0.42					0.42	

Ag Commissioner (AGC)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
27-Sep-01	Thu	0.71	0.73	2.8%			0.72	
28-Sep-01	Fri							
29-Sep-01	Sat							
30-Sep-01	Sun	2.31					*2.31*	Flow deviation
1-Oct-01	Mon	0.90					0.90	
2-Oct-01	Tue	1.16					1.16	
3-Oct-01	Wed	0.49	0.46	7.6%			0.48	
4-Oct-01	Thu							
5-Oct-01	Fri							
6-Oct-01	Sat	0.08	0.07	5.3%			0.08	
7-Oct-01	Sun	0.21					0.21	
8-Oct-01	Mon	0.16			0.17	3.0%	0.17	
9-Oct-01	Tue	0.39					0.39	
10-Oct-01	Wed							
Ave				7.8%		2.3%		
Count				9		2	28	

RD means laboratory replicate. FD means field duplicate sample. RPD means relative percent difference. Ppbv means parts per billion by volume. Flow deviation means final canister pressure was too low, or final flow was out of specification. Final values in italics have been qualified for these flow controller problems and are excluded from final calculations. MB means methyl bromide. "<" means less than, or non-detected at the value that follows. Count is the number of each type of sample for this site, and average is the average of the RPD for the type of duplicate or replicate (field or laboratory). Full scan means the results of the separate full scan GC/MS analysis.

Table 12. Edwards Community Center (EDW) Data

Edwards Community Center (EDW)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
15-Aug-01	Wed							
16-Aug-01	Thu							
17-Aug-01	Fri							
18-Aug-01	Sat							
19-Aug-01	Sun							
20-Aug-01	Mon							
21-Aug-01	Tue							
22-Aug-01	Wed							
23-Aug-01	Thu	0.02					0.02	
24-Aug-01	Fri	1.02					1.02	
25-Aug-01	Sat	0.69					0.69	
26-Aug-01	Sun	1.33	1.41		1.27	4.6%	1.33	Full scan: MB=1.30
27-Aug-01	Mon	1.00	0.96	4.9%			0.98	
28-Aug-01	Tue	0.44					0.44	
29-Aug-01	Wed	0.32					0.32	
30-Aug-01	Thu	0.58					0.58	
31-Aug-01	Fri							
1-Sep-01	Sat							
2-Sep-01	Sun							
3-Sep-01	Mon							
4-Sep-01	Tue	0.30					0.30	
5-Sep-01	Wed	0.12			0.06	69.7%	0.09	
6-Sep-01	Thu	0.59					0.59	Full scan: MB=0.50
7-Sep-01	Fri	0.20					0.20	
8-Sep-01	Sat							
9-Sep-01	Sun							
10-Sep-01	Mon							
11-Sep-01	Tue	1.30					1.30	
12-Sep-01	Wed	0.68					0.68	
13-Sep-01	Thu	0.64					0.64	
14-Sep-01	Fri	1.01					1.01	
15-Sep-01	Sat							
16-Sep-01	Sun	0.32					*0.32*	Flow deviation
17-Sep-01	Mon	0.54					0.54	
18-Sep-01	Tue	0.83					0.83	Full scan: MB=0.50
19-Sep-01	Wed	0.49					0.49	
20-Sep-01	Thu							
21-Sep-01	Fri							
22-Sep-01	Sat							
23-Sep-01	Sun							
24-Sep-01	Mon	4.09					4.09	
25-Sep-01	Tue	7.08					7.08	
26-Sep-01	Wed	11.15					11.15	

Edwards Community Center (EDW)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
27-Sep-01	Thu	4.05					4.05	
28-Sep-01	Fri							
29-Sep-01	Sat							
30-Sep-01	Sun	6.08					6.08	
1-Oct-01	Mon	0.38					0.38	
2-Oct-01	Tue	0.68					0.68	
3-Oct-01	Wed	0.22					0.22	
4-Oct-01	Thu							
5-Oct-01	Fri							
6-Oct-01	Sat	0.36					0.36	
7-Oct-01	Sun	0.35					*0.35*	Flow deviation
8-Oct-01	Mon	0.26					0.26	
9-Oct-01	Tue	0.82					0.82	
10-Oct-01	Wed							
Ave				4.9%		37.1%		
Count				1		2	30	

RD means laboratory replicate. FD means field duplicate sample. RPD means relative percent difference. Ppbv means parts per billion by volume. Flow deviation means final canister pressure was too low, or final flow was out of specification. Final values in italics have been qualified for these flow controller problems and are excluded from final calculations. MB means methyl bromide. "<" means less than, or non-detected at the value that follows. Count is the number of each type of sample for this site, and average is the average of the RPD for the type of duplicate or replicate (field or laboratory). Full scan means the results of the separate full scan GC/MS analysis.

Table 13. Plantell Nursery (PNT) Data

Plantell (PNT)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
15-Aug-01	Wed							
16-Aug-01	Thu							
17-Aug-01	Fri							
18-Aug-01	Sat							
19-Aug-01	Sun							
20-Aug-01	Mon							
21-Aug-01	Tue							
22-Aug-01	Wed							
23-Aug-01	Thu	--					--	No permission yet.
24-Aug-01	Fri	0.13	0.13	6.2%			*0.13*	Flow deviation
25-Aug-01	Sat	0.64					*0.64*	Flow deviation
26-Aug-01	Sun	0.34					0.34	
27-Aug-01	Mon	0.68					0.68	
28-Aug-01	Tue	0.10					0.10	
29-Aug-01	Wed	1.25	1.33	6.8%			1.29	
30-Aug-01	Thu	1.68					1.68	
31-Aug-01	Fri							
1-Sep-01	Sat							
2-Sep-01	Sun							
3-Sep-01	Mon							
4-Sep-01	Tue	0.24	0.21	13.6%			0.22	
5-Sep-01	Wed	0.43					0.43	
6-Sep-01	Thu	0.51					0.51	
7-Sep-01	Fri	0.25					*0.25*	Flow deviation
8-Sep-01	Sat							
9-Sep-01	Sun							
10-Sep-01	Mon							
11-Sep-01	Tue	1.76			1.85	4.9%	1.81	
12-Sep-01	Wed	0.78					0.78	
13-Sep-01	Thu	0.62	0.56	10.1%			0.59	
14-Sep-01	Fri	1.07					1.07	
15-Sep-01	Sat							
16-Sep-01	Sun	0.23					*0.23*	Flow deviation
17-Sep-01	Mon	0.61	0.53	14.2%			0.57	
18-Sep-01	Tue	0.75	0.76	0.9%			*0.75*	Flow deviation
19-Sep-01	Wed	0.85					*0.85*	Flow deviation
20-Sep-01	Thu							
21-Sep-01	Fri							
22-Sep-01	Sat							
23-Sep-01	Sun							
24-Sep-01	Mon	1.24					1.24	Full scan: MB=1.58
25-Sep-01	Tue	0.24			0.57	83.1%	0.41	Full scan: MB=1.15

Plantell (PNT)								
DATE	**Day**	**Result (ppbv)**	**RD**	**RPD-RD (%)**	**FD**	**RPD-FD (%)**	**Final (ppbv)**	**Notes**
26-Sep-01	Wed	0.55					0.55	
27-Sep-01	Thu	0.83					0.83	
28-Sep-01	Fri							
29-Sep-01	Sat							
30-Sep-01	Sun	2.69					2.69	
1-Oct-01	Mon	1.98					1.98	
2-Oct-01	Tue	1.85					1.85	
3-Oct-01	Wed	1.43					1.43	
4-Oct-01	Thu							
5-Oct-01	Fri							
6-Oct-01	Sat	0.77			0.87	12.6%	0.82	Full scan: MB=1.52
7-Oct-01	Sun	0.93					0.93	
8-Oct-01	Mon	0.20	0.22	10.6%			0.21	
9-Oct-01	Tue	2.26					2.26	
10-Oct-01	Wed							
Ave				8.9%		33.5%		
Count				7		3	31	

RD means laboratory replicate. FD means field duplicate sample. RPD means relative percent difference. Ppbv means parts per billion by volume. Flow deviation means final canister pressure was too low, or final flow was out of specification. Final values in italics have been qualified for these flow controller problems and are excluded from final calculations. MB means methyl bromide. "<" means less than, or non-detected at the value that follows. Count is the number of each type of sample for this site, and average is the average of the RPD for the type of duplicate or replicate (field or laboratory). Full scan means the results of the separate full scan GC/MS analysis.

Condensed Data Sets

Condensed data sets, consisting of only final validated data, are shown in Tables 14 and 15, for Oxnard/Camarillo and Santa Maria, respectively. Data from these tables was used for the statistical description of the results. Each of the eight weekly periods is delineated by an inner box. Each of these periods will be examined in more detail below.

Figures 5 and 6 show three-dimensional charts of the daily data. These data show the relative comparability of the various sites during different time periods. The charts are useful for a rough visual comparison, but a rigorous statistical comparison of the data is needed to fully characterize the data. As discussed more fully below, this full comparison will require missing data such as the methyl bromide usage data, which will then be combined with these data sets and the meteorological data sets to yield a more comprehensive picture of the impact to ambient air from fumigation.

Table 14. Condensed Final Data from Oxnard/Camarillo
(all data in ppbv)

DATE	Day	Week	PVW	UWC	SHA	ABD
15-Aug-01	Wed	1	1.82	2.58	0.69	
16-Aug-01	Thu		1.05	1.85	0.17	
17-Aug-01	Fri		3.17	1.80	0.18	
18-Aug-01	Sat					
19-Aug-01	Sun					
20-Aug-01	Mon					
21-Aug-01	Tue	2	0.50	1.53		
22-Aug-01	Wed		1.91	0.45		
23-Aug-01	Thu		2.49	4.35	2.94	
24-Aug-01	Fri			2.01	3.38	
25-Aug-01	Sat		0.81	0.25	1.09	
26-Aug-01	Sun					
27-Aug-01	Mon					
28-Aug-01	Tue	3	0.12	0.21	1.09	
29-Aug-01	Wed		0.15	0.10	0.07	
30-Aug-01	Thu		0.28	0.35	0.56	0.44
31-Aug-01	Fri		0.15	0.18		
1-Sep-01	Sat					
2-Sep-01	Sun					
3-Sep-01	Mon					
4-Sep-01	Tue					
5-Sep-01	Wed					
6-Sep-01	Thu	4	0.20		0.04	0.05
7-Sep-01	Fri		0.10		0.03	0.13
8-Sep-01	Sat		0.07		0.05	0.13
9-Sep-01	Sun		0.16		0.23	0.39
10-Sep-01	Mon					

DATE	Day	Week	PVW	UWC	SHA	ABD
11-Sep-01	Tue					
12-Sep-01	Wed					
13-Sep-01	Thu	5	0.17		0.38	0.07
14-Sep-01	Fri		0.15		0.07	0.10
15-Sep-01	Sat		0.20		0.13	0.15
16-Sep-01	Sun		0.29		0.11	0.11
17-Sep-01	Mon	6	0.35		0.13	0.14
18-Sep-01	Tue					
19-Sep-01	Wed		0.18	0.18	0.10	0.10
20-Sep-01	Thu		0.59	0.30	0.36	0.11
21-Sep-01	Fri					
22-Sep-01	Sat					
23-Sep-01	Sun					
24-Sep-01	Mon					
25-Sep-01	Tue					
26-Sep-01	Wed	7	0.17	0.60	0.45	0.25
27-Sep-01	Thu		0.08		0.09	0.12
28-Sep-01	Fri		0.08		0.10	0.15
29-Sep-01	Sat		0.11		0.19	0.19
30-Sep-01	Sun		0.15		0.07	0.06
1-Oct-01	Mon					
2-Oct-01	Tue					
3-Oct-01	Wed					
4-Oct-01	Thu					
5-Oct-01	Fri					
6-Oct-01	Sat					
7-Oct-01	Sun	8	0.06	0.07	0.10	0.04
8-Oct-01	Mon		0.05	0.05	0.05	0.06
9-Oct-01	Tue		0.09	0.07	0.07	0.10
10-Oct-01	Wed		0.10	0.07	0.11	0.11

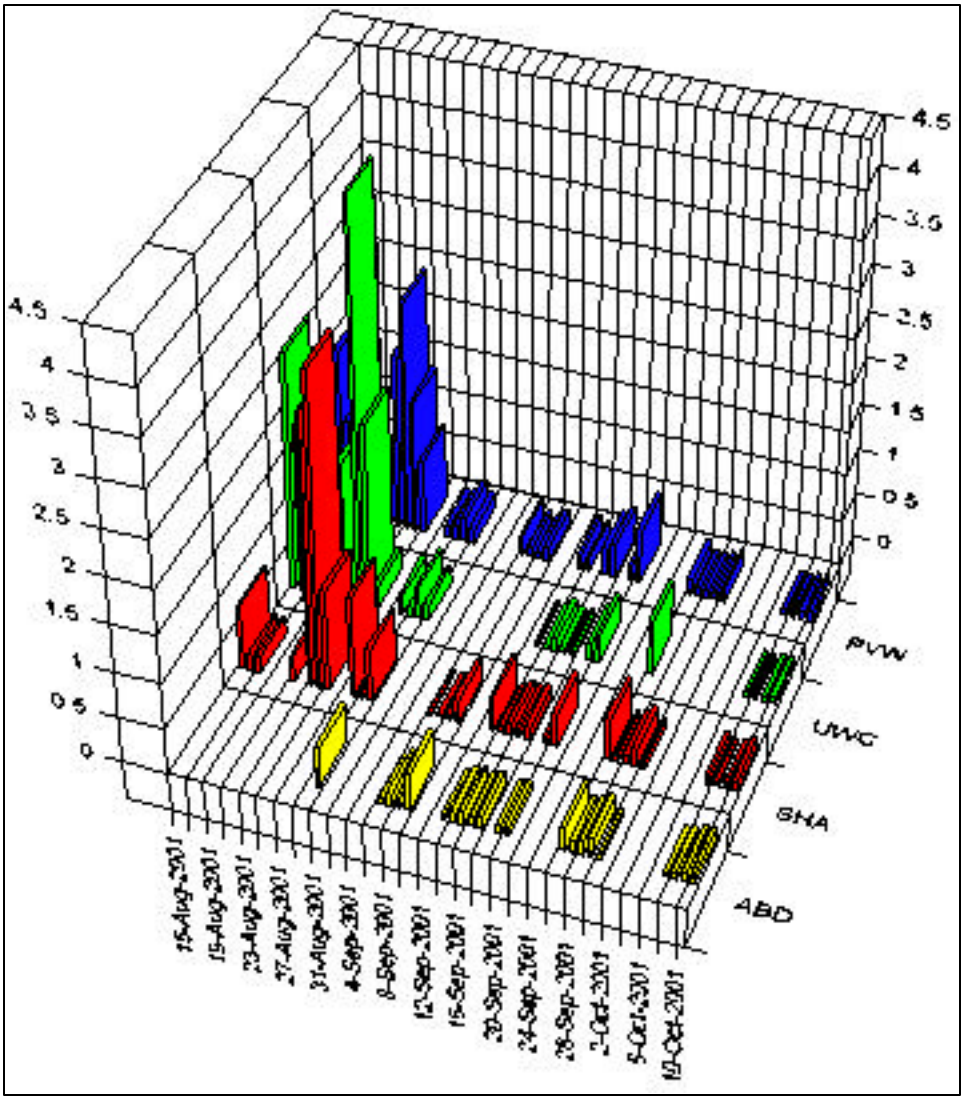


Figure 5. Three dimensional plot of Oxnard/Camarillo Data
Z-axis units are ppbv of methyl bromide.

Table 15. Condensed Final Data from Santa Maria
(all data in ppbv)

DATE	Day	Week	BLO	AGC	EDW	PNT
15-Aug-01	Wed					
16-Aug-01	Thu					
17-Aug-01	Fri					
18-Aug-01	Sat					
19-Aug-01	Sun					
20-Aug-01	Mon					
21-Aug-01	Tue					
22-Aug-01	Wed					
23-Aug-01	Thu	1	0.04	0.03	0.02	
24-Aug-01	Fri		0.03	0.13	1.02	
25-Aug-01	Sat		0.68	0.11	0.69	
26-Aug-01	Sun		3.46	0.13	1.33	0.34
27-Aug-01	Mon	2	2.09	0.14	0.98	0.68
28-Aug-01	Tue		0.19	0.06	0.44	0.10
29-Aug-01	Wed		0.34	0.02	0.32	1.29
30-Aug-01	Thu		0.30	0.06	0.58	1.68
31-Aug-01	Fri					
1-Sep-01	Sat					
2-Sep-01	Sun					
3-Sep-01	Mon					
4-Sep-01	Tue	3	0.07	0.05	0.30	0.22
5-Sep-01	Wed		0.17	0.05	0.09	0.43
6-Sep-01	Thu		0.21	0.13	0.59	0.51
7-Sep-01	Fri		0.11		0.20	
8-Sep-01	Sat					
9-Sep-01	Sun					
10-Sep-01	Mon					
11-Sep-01	Tue	4	1.47	0.15	1.30	1.81
12-Sep-01	Wed			0.21	0.68	0.78
13-Sep-01	Thu		0.40	0.21	0.64	0.59
14-Sep-01	Fri		0.51	0.20	1.01	1.07
15-Sep-01	Sat					
16-Sep-01	Sun	5	0.78			
17-Sep-01	Mon		0.31	0.14	0.54	0.57
18-Sep-01	Tue		0.33	0.37	0.83	
19-Sep-01	Wed		0.42	0.30	0.49	
20-Sep-01	Thu					
21-Sep-01	Fri					
22-Sep-01	Sat					
23-Sep-01	Sun					
24-Sep-01	Mon	6	2.22	0.20	4.09	1.24

DATE	Day	Week	BLO	AGC	EDW	PNT
25-Sep-01	Tue		1.12		7.08	
26-Sep-01	Wed		0.34	0.42	11.15	0.55
27-Sep-01	Thu		1.20	0.72	4.05	0.83
28-Sep-01	Fri					
29-Sep-01	Sat					
30-Sep-01	Sun	7	4.55		6.08	2.69
1-Oct-01	Mon		0.24	0.90	0.38	1.98
2-Oct-01	Tue		0.52	1.16	0.68	1.85
3-Oct-01	Wed		0.24	0.48	0.22	1.43
4-Oct-01	Thu					
5-Oct-01	Fri					
6-Oct-01	Sat	8	0.58	0.08	0.36	0.82
7-Oct-01	Sun		0.52	0.21		0.93
8-Oct-01	Mon		0.21	0.17	0.26	0.21
9-Oct-01	Tue		1.04	0.39	0.82	2.26

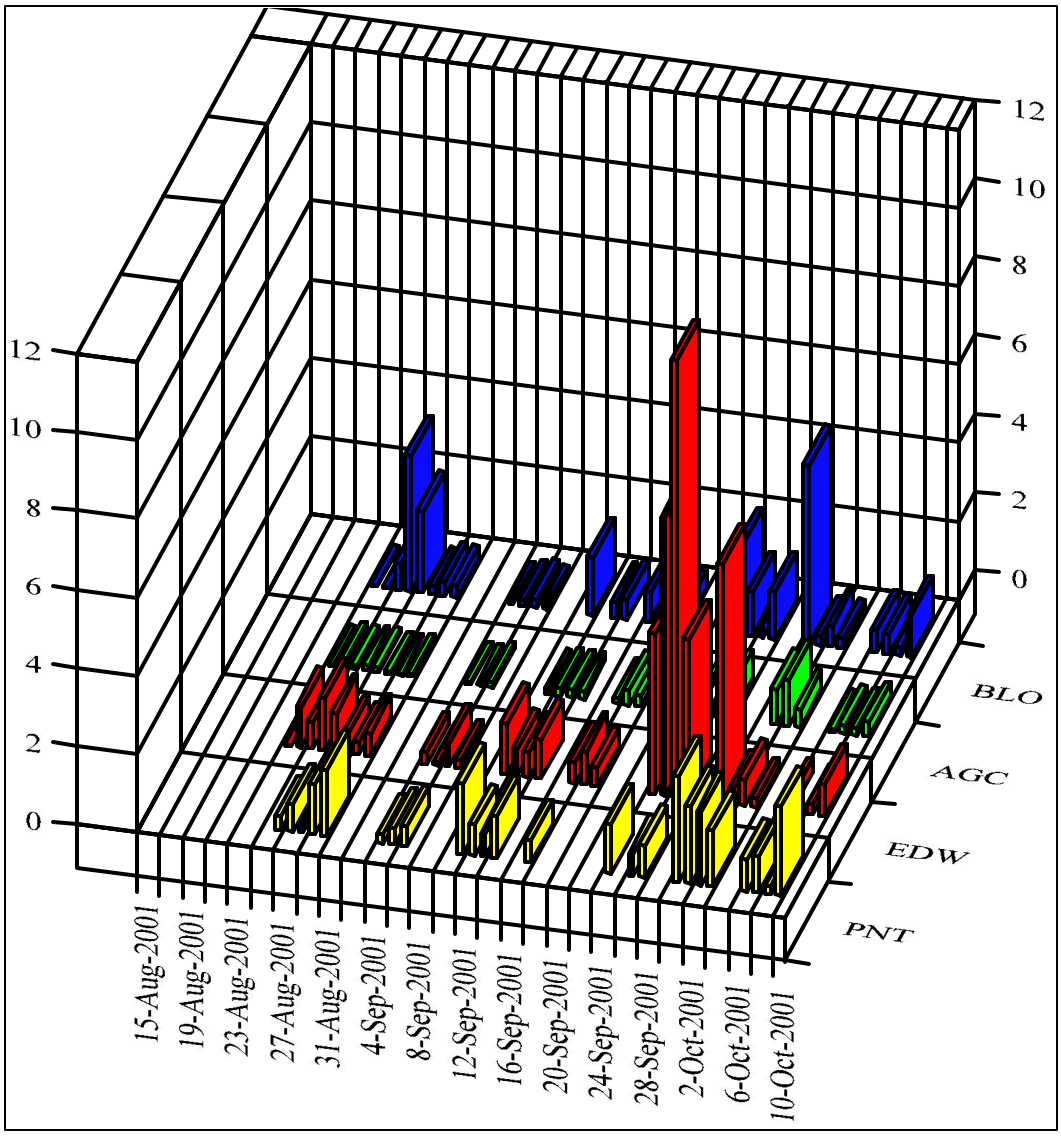


Figure 6. Three-dimensional plot of Santa Maria data
Z-axis units are ppbv of methyl bromide.

Data Evaluation and Interpretation—Concentrations

The previous discussions have presented the data in a solely qualitative fashion—when and where the samples were collected, along with quality assurance data, etc. However, for the purposes of an assessment of the impact of the methyl bromide concentrations to the community, a more rigorous assessment of the concentration values and other parameters that affect the dispersion of the methyl bromide plume is needed.

There are three factors that can be used in understanding the methyl bromide air samples collected:

- Concentrations at each sampling site;
- Meteorological conditions during the sampling periods; and
- Methyl bromide usage rates at the specific fumigation locations

Each of these factors will be addressed in concert below.

Statistical Approach

A general approach for statistical evaluation has been followed for this program, and it consists of the following five steps:

1. Collect and validate the data;
2. Characterize the data set;
3. If possible, transform the data set into a more usable form;
4. Select the appropriate statistical tests or descriptors; and
5. Perform the calculations.

Results of Statistical Procedures

1. Collect and validate the data.

Most of the previous discussion has focused on this step. Tables 8 and 9 consist of the validated data for use in further calculations.

2. Characterize the data set.

The characterization of a data set for statistical evaluation consists first of all of determining the underlying distribution of the data. The distribution of the data is a description of the range of data that is expected to be measured under routine circumstances. The typical bell curve is called a "normal" distribution and describes the behavior of many phenomena. This is also called the gaussian distribution. Generally, regardless of the process or property measured, whenever large amounts of data are involved, it more closely approximates the normal distribution.

The key point about distributions of data is that the type of test or calculation that is performed is dependent on the type of distribution that the data takes. The standard assumption for common statistical descriptors is that the data set is from a standard gaussian distribution. Another term for this kind of calculation is parametric. The common arithmetic average is a parametric procedure.

Two main descriptors of a distribution arise out of its characterization: localization of central tendency, and dispersion. The central tendency is the commonly termed average and the dispersion is the amount of variability around that average.

An important issue to keep aware of in the context of environmental data evaluation is that environmental data frequently does not adhere to the normal distribution.[11] Therefore, it is especially critical that the underlying distribution be characterized so that the appropriate tests are performed on the data set. A violation of the assumptions of a statistical test raises the possibility of error in the final results.

After validation as described above, each data set in this program was subjected to a number of tests to determine if its underlying distribution was gaussian. The statistical programs Minitab, SPSS, and JMP were all used to evaluate the distributions underneath these sets of data. Each of these programs provides a slightly different set of tools, both calculational and graphic, to examine the data.

First, each data set was tested with the Shapiro-Wilk W statistic to determine if the distribution was normal by comparing it to expected probabilities in a gaussian curve. This test produced a probability of less than 0.01 percent that the each of the two data sets was normal

Secondly, the common probability plot graphical test was performed. This test consists of plotting the measurement data against expected values for a gaussian distribution. The graphic comparison showed dramatically that the data set was not gaussian. The Oxnard/Camarillo data was most clearly nonnormal, as the probability plot in shown in Figure 7 demonstrates.

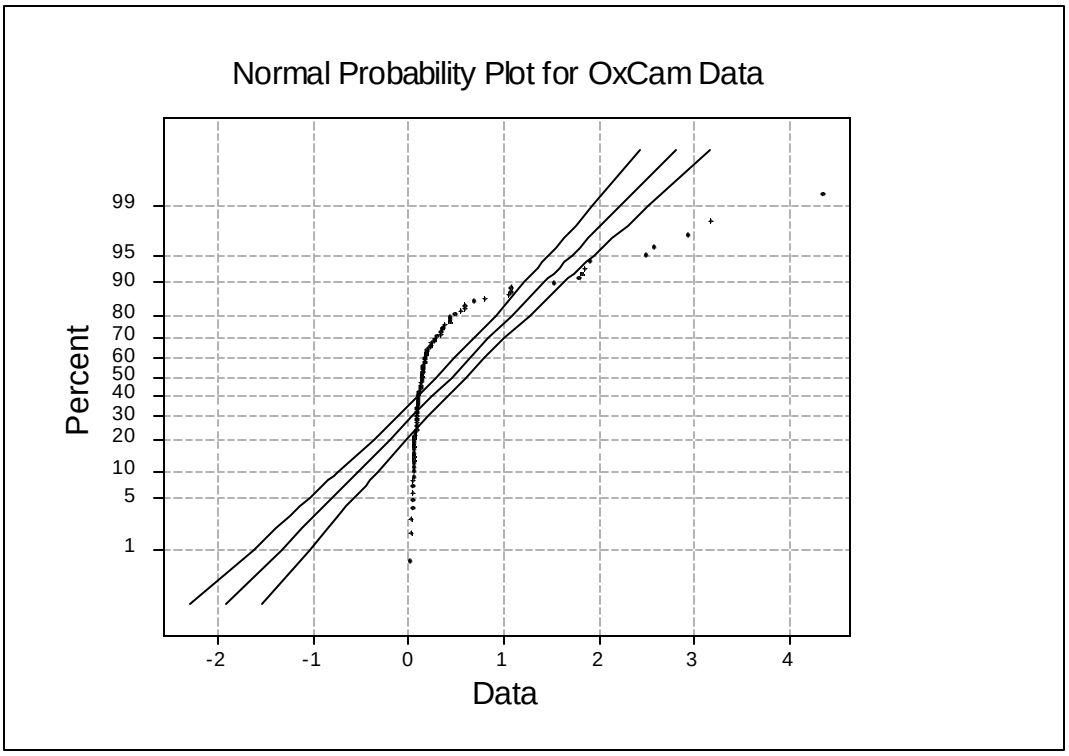


Figure 7. Normal Distribution Probability Plot of Oxnard/Camarillo Data

The probability plot is interpreted by looking at the center straight line, which contains the expected values of the distribution if the population was normal, or gaussian. The outside curves are the uncertainly limits around that central line, so if the data points fall within those curves, it still can be considered close to the line. Clearly the Oxnard/Camarillo data do not fit this curve.

In addition to the probability plot, six common distributions were examined using the Andersen-Darling statistic for fit to that distribution: extreme value, Wiebull, log e, exponential, logistic, and normal.[12] The natural log transform gave the best result but still was not a good fit.

3. Transforming the data is a way to handle this kind of situation: transform the data into a simulated gaussian distribution, or use nonparametric statistics.[13] The Oxnard/Camarillo data was transformed into the lognormal distribution by taking its natural log.

Figure 8 shows the result of a lognormal probability plot. The data still is substantially outside of the uncertainty curves, showing that the transformed data still does meet the gaussian distribution.

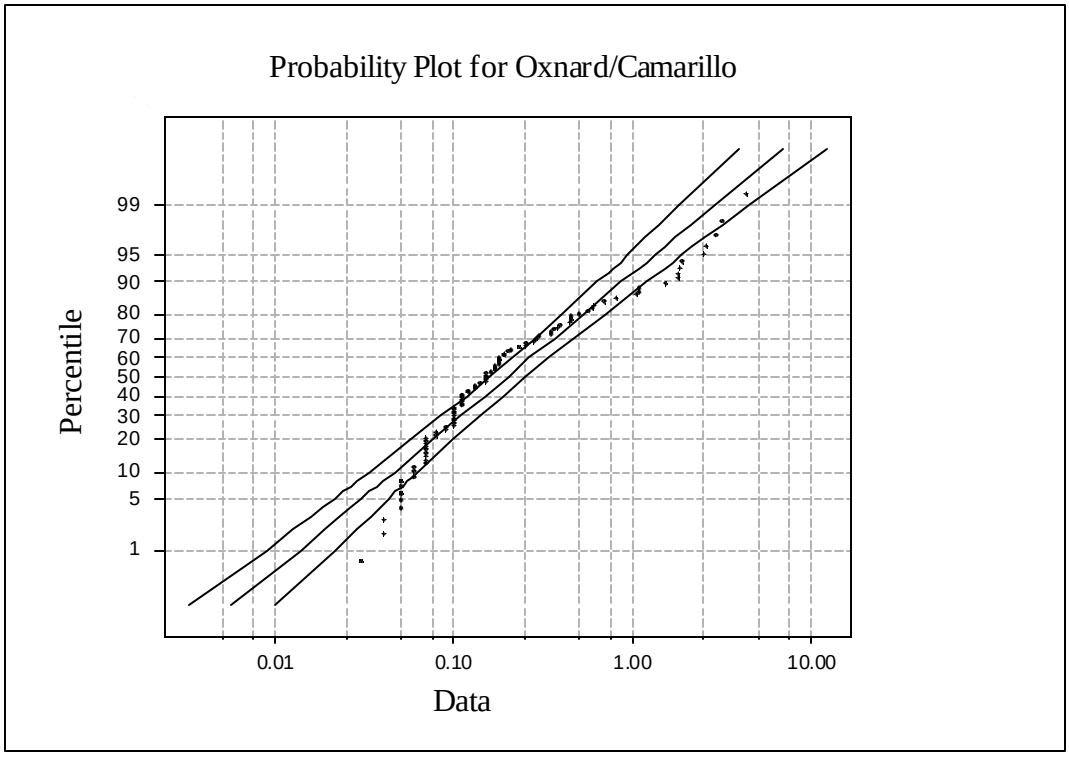


Figure 8. Probability Plot for Lognormal Transform of Oxnard/Camarillo Data

The alternative, therefore, is to use nonparametric statistics, or statistics that do not take any assumption of the underlying distribution.[14] These statistics are also called "robust" statistics since they are resistant to outliers, something of concern for this data set due to some values substantially higher than the majority of the data set.[15]

The nonparametric statistic process provides a result that can be much more efficient than the parametric procedures when the underlying populations are not normal, as in this case. Therefore, for the Oxnard/Camarillo data set, the nonparametric procedures were followed.

The examination of the Santa Maria data showed that it fit the lognormal distribution well, so that data set will be handled in that fashion. Figure 9 shows the probability plot for the log transformed data, indicating a good fit to the normal curve. In addition, other non-graphical tests showed a high probability of being a gaussian distribution. Therefore, the Santa Maria data set will be used in its lognormal transformation.

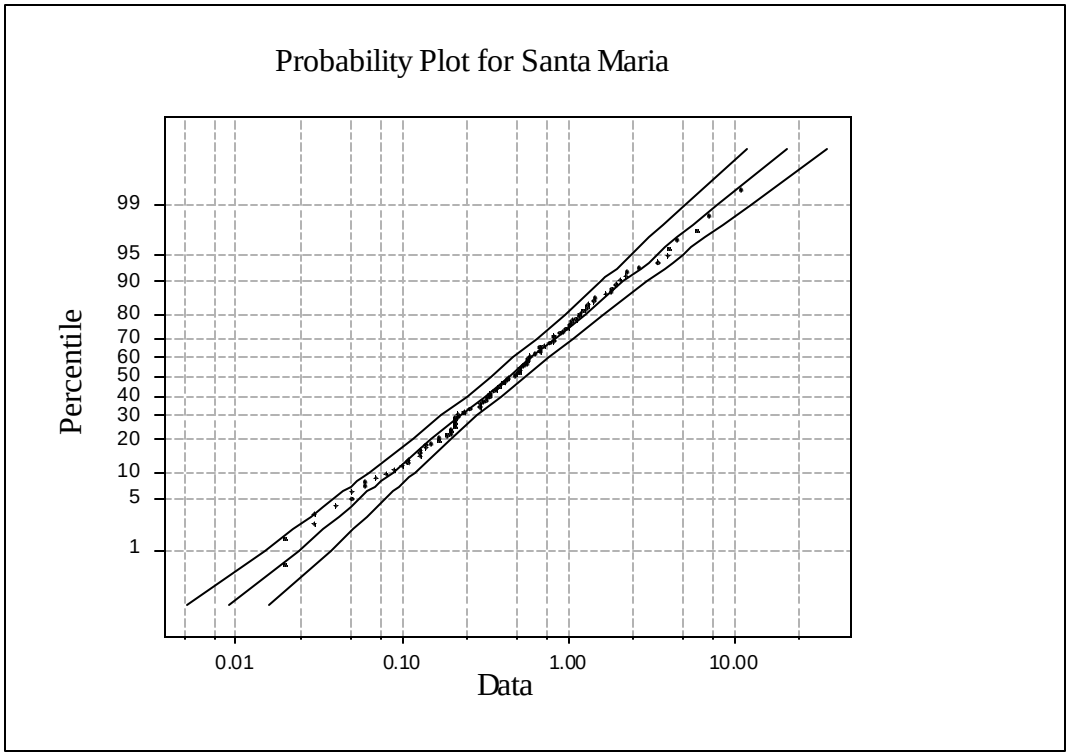


Figure 9. Probability Curve for Log Transformed Data

4. Select the appropriate statistical tests.

The nature of this monitoring program was primarily descriptive, so no testing in the classic statistical sense will be performed other than testing for distribution as done above or comparing one location versus the other. From the analysis of the distribution, it can be seen that the Oxnard/Camarillo data will need to be treated in a nonparametric fashion, while the Santa Maria data will need to be treated using log-transformed data. The majority of the statistics will be primarily descriptive statistics. These statistics will provide the basis for comparison of the measured values against accepted health-based standards for risk or public health.

5-A. Calculation of Descriptive Statistics for Oxnard/Camarillo Data

Table 16 contains the results of the nonparametric statistical calculations on the Oxnard/Camarillo data set. The table contains the breakdown of the four sampling sites over the entire eight week period along with the entire data set. The source for the data in these calculations is the validated data set in Table 8.

As mentioned above, a key parameter of a distribution is the location, or central tendency. For nonparametric statistics, the median is the central location. Upper and lower 95% confidence limits around that median were also calculated (UCL and LCL, respectively), along with the 95th percentile, shown on the table as 95th.

Site	Median	95% UCL	95% LCL	95th
PVW	0.28	0.76	0.15	2.76
UWC	0.33	1.04	0.14	3.91
SHA	0.22	0.40	0.115	3.14
ABD	0.12	0.18	0.095	0.44
	Median	**95% UCL**	**95% LCL**	**95th**
All	0.15	0.18	0.11	2.50

Units: ppbv

Table 16. Oxnard/Camarillo Nonparametric Distribution Statistics

5-B. Calculation of Descriptive Statistics for Santa Maria Data

As described above, the Santa Maria data was gaussian when transformed into a lognormal distribution. Therefore, parametric calculations can be performed on that transformed data. In this process, there is some potential for small errors, but the overall parametric procedures have a high level of statistical power when larger amount of data are available.[16]

Table 17 contains the result of the lognormal transform descriptive statistics calculations. The data in Table 17 were calculated from the validated data in Table 9.

Site	Mean	Std. Error of Mean	Std. Deviation	Median	95th
BLO	0.58	1.23	1.18	0.73	3.86
AGC	0.27	1.20	1.22	0.21	1.04
EDW	0.81	1.27	1.19	1.01	8.68
PNT	0.89	1.18	1.12	1.11	2.58
	Mean	**Std. Error of Mean**	**Std. Deviation**	**Median**	**95th**
All	0.42	1.12	3.46	0.43	3.80

Units: ppbv

Table 17. Santa Maria Lognormal Distribution Statistics

Weekly Statistics

The above table present the entire study period average for the entire data set and the individual sampling sites. Table 18 contains a breakdown into weekly averages and medians for the Oxnard/Camarillo and Santa Maria data sets. This view of the data effectively smoothes out the high values seen in the detailed plots in Figures 5 and 6. Figures 10 and 11 show the plot of these weekly values.

Interpretation of the Statistical Data

The results from the descriptive statistical analysis presented above show that for both locations, the average or median concentration over the 8 week period is below the health risk reference concentration level of 1 ppbv for children and 2 ppbv for adults.

Some of the higher values that contributed to these averages were seen to be potentially source-impacted, as discussed below, which suggests a localized contribution and possibly biasing the average. Being source-impacted suggests that the sampling location was too close to a current fumigation and not representative of an ambient air sample.

However, the values obtained above will be important in the comparison of the measured concentrations to the accepted the health risk reference concentrations.

Week	1	2	3	4	5	6	7	8	8 Weeks	95th	All Weeks
BLO	0.24	0.45	0.13	0.67	0.43	1.00	0.60	0.51	0.43	3.86	0.43
AGC	0.09	0.06	0.07	0.19	0.25	0.39	0.79	0.18	0.17	1.04	
EDW	0.35	0.53	0.24	0.87	0.60	6.01	0.76	0.42	0.68	8.68	
PNT	0.34	0.62	0.36	0.97	0.57	0.82	1.94	0.77	0.69	2.58	
Week	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**8 Weeks**	**95th**	**All Weeks**
PVW	1.82	1.44	0.15	0.13	0.17	0.35	0.11	0.07	0.16	2.76	0.15
UWC	1.85	1.53	0.19		0.06	0.24	0.60	0.07	0.24	3.91	
SHA	0.18	2.01	0.56	0.04	0.11	0.23	0.10	0.08	0.15	3.14	
ABD			0.44	0.13	0.11	0.11	0.15	0.08	0.12	0.44	

Units: ppbv

.Table 18. Weekly statistics for Oxnard/Camarillo and Santa Maria

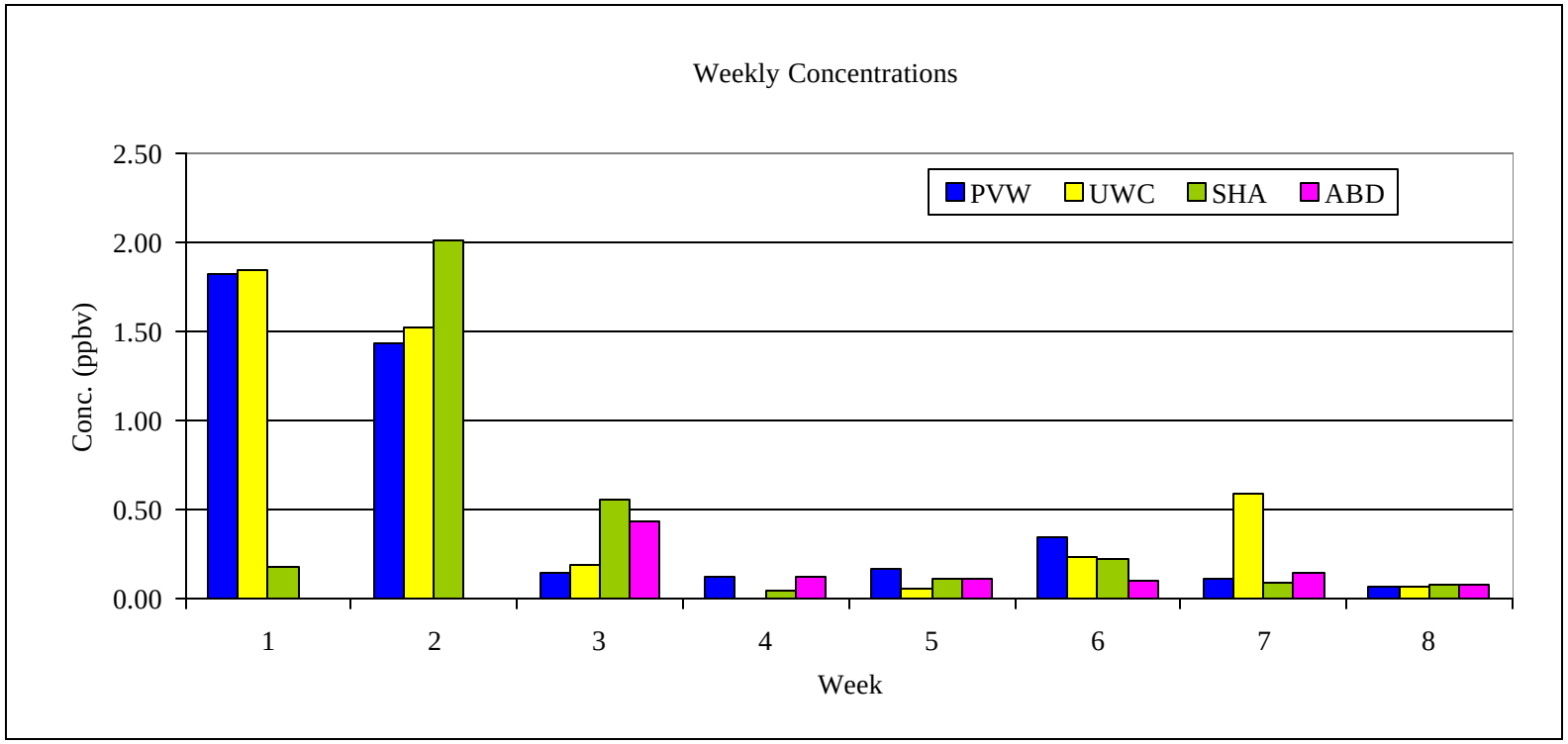


Figure 10. Plot of Weekly Median Concentrations of Oxnard/Camarillo Data.

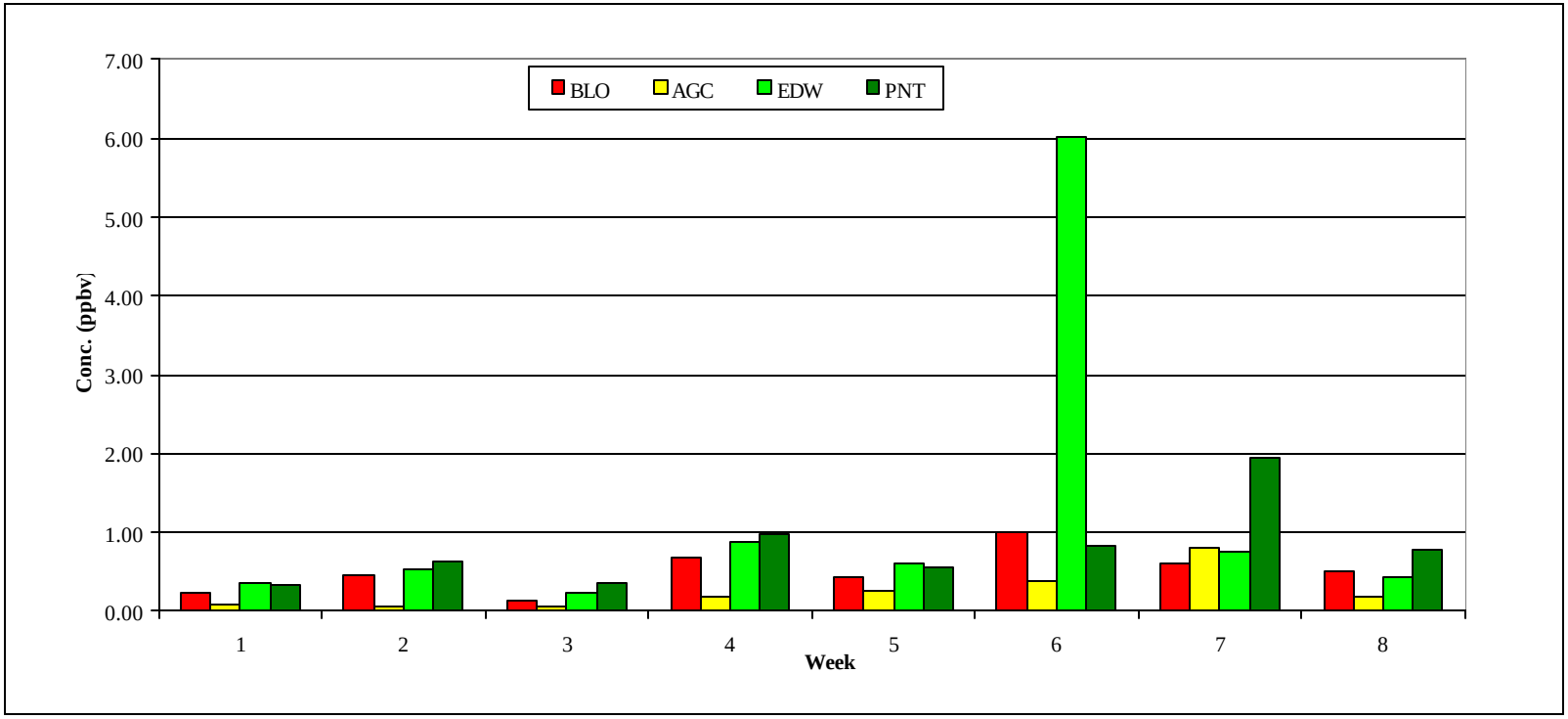


Figure 11. Plot of Weekly Average Concentrations of Santa Maria Data.

Data Evaluation and Interpretation—Concentrations, Meteorological Data, and Fumigant Usage

A full examination of the concentration, spatial and meteorological data is important to understand the dispersion of the fugitive fumigation gas into the community. In particular, attempts to link the level of fumigant usage to ambient concentrations over a large land area require looking at the data in many ways. This examination will be conducted in increasingly detailed levels—from the overall grand average 8-week view, to weekly, and then to daily levels if necessary.

The steps in conducting this examination are to first have concentration data, as discussed above, summarize the large amount of meteorological data into useful parcels, and then obtain usage data. Following descriptions of the efforts to obtain these data sets, the results of these steps will be combined into one interpretive examination of the data set.

Meteorological Data Reduction

There were two types of meteorological data collected. Each sampling site had its own "micromet" sensor set that collected wind speed, wind direction, and temperature data in five minute intervals during the sampling period. This sensor set was co-located with the canister sampler and was designed to capture localized meteorological conditions during the sampling period. In addition, a "main met" station was located at a central sampling point, which collected a more extensive array of weather data including wind speed and direction, temperature, relative humidity, and barometric pressure. This sensor set on the "main met station" consisted of higher quality sensors and data loggers, and therefore was relied on as the source for regional meteorological conditions. These data were collected on an averaging period of 15 minutes during the entire study period.

In order to reduce the large volume of data from these instruments, the wind speed and direction data from the micromet stations was reduced into wind rose plots using WRPlot. Plots were made for the entire study period along with weekly sampling periods. Any particular day monitoring data that required it was also examined in this fashion.

The wind rose for the entire study period shows that the wind comes from the west the majority of the time. The diurnal pattern shows that daily wind direction is fairly constant during the daytime hours between SSW (200 degrees) to SW (270 degrees). Night time hours appear to be much more random.

Methyl Bromide Usage

A comparison of the methyl bromide ambient air concentration data with fumigation records showing the amount used during the sampling period should be performed in order to understand the potential for directly impacting any of the field samples as well as any relationship that could be developed between the two sets of data.

This process was performed by obtaining from the Ventura and Santa Maria county agricultural commissioners' offices the fumigation records contained in Pesticide Use Reports. In the case of Ventura County, this effort was made more difficult by the large number and variety of agricultural products that use fumigation. However, for both counties, electronic subsets of their data bases were eventually made available.

These electronic records contained limited information about location of the fumigation and nothing about the time of fumigation. Therefore, the terse descriptions of the fumigation locations were examined and an approximate location obtained on a map. Latitude and longitude estimates of the locations were recorded. Daily use of the fumigant product was adjusted for methyl bromide content by the description of the amount of methyl bromide in the mixture. The final result was a list of dates, location coordinates, and the amount of methyl bromide used on that date.

Data was compiled for the period of August 13-October 9 in areas of Ventura County that were close to the monitoring sites. For example, fumigation sites on the north side of Santa Paula, in Moor Park, and in Fillmore were not included in the tabulation. A total of 100 fumigations were included in the analysis period for Ventura. The period of August 23 to October 10 was compiled for Santa Maria., for a total of 116 fumigation usages.

The records are limited by the uncertain geographical location information and the exact timing of the operations. However, since long-range dispersion is of greater interest, those factors become less important as the emission plume spreads over the large geographical target area and 24-hour periods.

Tables 19 and 20 contain the data set obtained as well as ambient concentrations. This tabulation includes a summation of the individual daily uses into a total daily value.

Table 19. Oxnard/Camarillo Fumigations during Study Period

Date	*Lat*	*Long*	*Site Use*	*Day Use*	*PVW*	*UWC*	*SHA*	*ABD*
	Location of fumigation site		Lbs of MB used per site	Total MB use for day	Oxnard/Camarillo Sampling sites			
Units: concentration=ppbv; fumigant usage=lbs; coordinates=degrees								
08/13/01	34.220	-119.121	13010	23347				
08/13/01	34.230	-119.211	5330					
08/13/01	34.165	-119.222	369					
08/13/01	34.218	-119.223	4606					
08/14/01	34.179	-119.143	17713	35542				
08/14/01	34.219	-119.223	6600					
08/14/01	34.240	-119.114	11229					
08/15/01	34.145	-119.140	3713	19016	1.82	2.58	0.69	
08/15/01	34.162	-119.127	3506					
08/15/01	34.218	-119.223	5528					
08/15/01	34.243	-119.221	4703					
08/15/01	34.207	-119.027	1568					
08/16/01	34.214	-119.026	8291	8291	1.05	1.85	0.17	
08/17/01					3.17	1.80	0.18	
08/18/01	34.204	-119.033	13324	35992				
08/18/01	34.146	-119.106	9581					
08/18/01	34.189	-119.139	461					
08/18/01	34.255	-119.144	6270					
08/18/01	34.269	-119.969	2395					
08/18/01	34.163	-119.126	3685					
08/18/01	34.262	-119.178	276					
08/19/01	34.219	-119.239	12898	32233				
08/19/01	34.241	-119.123	5486					
08/19/01	34.221	-119.123	6270					
08/19/01	34.186	-119.037	369					
08/19/01	34.162	-119.127	2508					
08/19/01	34.245	-119.219	4703					
08/20/01	34.210	-119.166	7994	33445				
08/20/01	34.214	-119.140	6270					
08/20/01	34.237	-119.179	227					
08/20/01	34.191	-119.145	2888					
08/20/01	34.214	-119.026	4076					
08/20/01	34.214	-119.026	11991					
08/21/01	34.219	-119.223	4744	9903	0.50	1.53	0.28	
08/21/01	34.214	-119.139	5159					
08/22/01	34.161	-119.121	12227	61318	1.91	0.45		
08/22/01	34.212	-119.027	49091					
08/23/01	34.162	-119.127	3501	10633	2.49	4.35	2.94	
08/23/01	34.158	-119.146	7132					
08/24/01	34.169	-119.135	784	25721	1.44	2.01	3.38	
08/24/01	34.162	-119.098	13851					
08/24/01	34.214	-119.140	5957					

Date	*Lat*	*Long*	*Site Use*	*Day Use*	*PVW*	*UWC*	*SHA*	*ABD*
	Location of fumigation site		Lbs of MB used per site	Total MB use for day	Oxnard/Camarillo Sampling sites			
Units: concentration=ppbv; fumigant usage=lbs; coordinates=degrees								
08/24/01	34.148	-119.098	5130					
08/25/01	34.162	-119.131	921	6080	0.81	0.25	1.09	
08/25/01	34.160	-119.138	470					
08/25/01	34.191	-119.145	2978					
08/25/01	34.162	-119.098	1710					
08/26/01	34.235	-119.126	6113	27638				
08/26/01	34.162	-119.127	6633					
08/26/01	34.212	-119.027	14891					
08/27/01								
08/28/01					0.12	0.21	1.09	
08/29/01	34.219	-119.223	5775	5775	0.15	0.10	0.07	
08/30/01	34.210	-119.220	553	2904	0.28	0.35	0.56	0.44
08/30/01	34.220	-119.122	2351					
08/31/01	34.185	-119.117	12070	12271	0.15	0.18		
09/01/01								
09/02/01	34.195	-119.159	12405	22123				
09/02/01	34.271	-119.127	8935					
09/02/01	34.234	-119.925	627					
09/02/01	34.325	-119.100	157					
09/03/01								
09/04/01	34.214	-119.139	3685	11061				
09/04/01	34.339	-119.410	6270					
09/04/01			553					
09/04/01	34.264	-119.238	553					
09/05/01								
09/06/01	34.220	-119.122	168	168	0.20		0.04	0.05
09/07/01	34.165	-119.222	461	461	0.10		0.03	0.13
09/08/01	34.218	-119.223	138	9315	0.07		0.05	0.13
09/09/01	34.253	-119.143	9177	9490	0.16		0.23	0.39
09/09/01	34.262	-119.180	313					
09/10/01								
09/11/01	34.234	-119.118	9483	18967				
09/11/01	34.234	-119.118	9483					
09/12/01	34.209	-119.215	276	1271				
09/12/01	34.148	-119.120	553					
09/12/01	34.131	-119.145	221					
09/12/01	34.131	-119.145	221					
09/13/01					0.17	0.07	0.38	0.07
09/14/01					0.15	0.05	0.07	0.10
09/15/01	34.218	-119.223	129	193	0.20	0.14	0.13	0.15
09/15/01	34.358	-119.047	64					
09/16/01	34.232	-119.154	441	441	0.29	0.06	0.11	0.11
09/17/01	34.169	-119.068	1106	2830	0.35	0.07	0.13	0.14
09/17/01	34.205	-119.062	1724					

Date	*Lat*	*Long*	*Site Use*	*Day Use*	*PVW*	*UWC*	*SHA*	*ABD*
	Location of fumigation site		Lbs of MB used per site	Total MB use for day	Oxnard/Camarillo Sampling sites			
Units: concentration=ppbv; fumigant usage=lbs; coordinates=degrees								
09/18/01	34.232	-119.154	441	1176				
09/18/01	34.232	-119.154	735					
09/19/01					0.18	0.18	0.10	0.10
09/20/01	34.204	-119.121	5173	14275	0.59	0.30	0.36	0.11
09/20/01	34.179	-119.118	6897					
09/20/01	34.232	-119.154	735					
09/20/01	34.232	-119.154	1470					
09/21/01								
09/22/01	34.262	-119.180	313	3505				
09/22/01	34.232	-119.154	2940					
09/22/01	34.363	-119.028	184					
09/22/01	34.358	-119.047	68					
09/23/01	34.232	-119.154	735	1288				
09/23/01	34.163	-119.115	553					
09/24/01	34.232	-119.154	368	368				
09/25/01								
09/26/01	34.232	-119.154	735	1103	0.17	0.60	0.45	0.25
09/26/01	34.232	-119.154	368					
09/27/01					0.08		0.09	0.12
09/28/01	34.220	-119.122	705		0.08		0.10	0.15
09/29/01	34.218	-119.223	184	552	0.11		0.19	0.19
09/29/01	34.232	-119.154	368					
09/30/01					0.15		0.07	0.06
10/01/01	34.220	-119.122	549	549				
10/02/01								
10/03/01								
10/04/01								
10/05/01	34.243	-119.126	171	171				
10/06/01	34.174	-119.146	553	1534				
10/06/01	34.204	-119.060	553					
10/06/01	34.262	-119.180	369					
10/07/01					0.06	0.07	0.10	0.04
10/08/01					0.05	0.05	0.05	0.06
10/09/01					0.09	0.07	0.07	0.10
10/10/01					0.10	0.07	0.11	0.11

Table 20. Santa Maria Fumigant Usage

Date	***Lat***	***Long***	***Site Use***	***Day Use***	***BLO***	***AGC***	***EDW***	***PNT***
	Location of fumigation site		Lbs of MB used per site	Total MB use for day	Santa Maria Sampling sites			
Units: concentration=ppbv; fumigant usage=lbs; coordinates=degrees								
08/20/01	34.915	-120.385	9,600	9,600				
08/21/01								
08/22/01								
08/23/01					0.04	0.03	0.02	
08/24/01	34.982	-120.471	625	1,375	0.03	0.13	1.02	
08/24/01	34.982	-120.471	750					
08/25/01	34.982	-120.471	625	1,875	0.68	0.11	0.69	
08/25/01	34.982	-120.471	1,250					
08/26/01	34.982	-120.471	625	2,500	3.46	0.13	1.33	0.34
08/26/01	34.982	-120.471	1,875					
08/27/01	34.982	-120.471	625	8,661	2.09	0.14	0.98	0.68
08/27/01	34.982	-120.471	1,875					
08/27/01	34.915	-120.385	6,161					
08/28/01	34.982	-120.471	1,875	10,275	0.19	0.06	0.44	0.10
08/28/01	34.915	-120.385	8,400					
08/29/01	34.982	-120.471	1,250	1,250	0.34	0.02	0.32	1.29
08/30/01	34.982	-120.471	625	625	0.30	0.06	0.58	1.68
08/31/01	34.982	-120.471	1,125	1,125				
09/01/01	34.982	-120.471	1,125	3,961				
09/01/01	34.982	-120.471	625					
09/01/01	34.893	-120.438	2,211					
09/02/01	34.982	-120.471	16,500	16,500				
09/03/01	34.982	-120.471	1,375	1,375				
09/04/01	34.982	-120.471	1,375	1,375	0.07	0.05	0.30	0.22
09/05/01	34.982	-120.471	1,375	2,625	0.17	0.05	0.09	0.43
09/05/01	34.880	-120.350	1,250					
09/06/01	34.982	-120.471	750	2,625	0.21	0.13	0.59	0.51
09/06/01	34.880	-120.350	1,875					
09/07/01	34.880	-120.350	1,875	1,875	0.11		0.20	
09/08/01								
09/09/01	34.927	-120.457	3,325	3,325				
09/10/01	34.894	-120.386	1,250	1,250				
09/11/01	34.982	-120.471	1,000	1,000	1.47	0.15	1.30	1.81
09/12/01	34.982	-120.471	1,000	14,972		0.21	0.68	0.78
09/12/01	34.932	-120.401	12,722					
09/12/01	34.918	-120.409	1,250					
09/13/01	34.982	-120.471	1,000	1,000	0.40	0.21	0.64	0.59
09/14/01	34.982	-120.471	1,250	3,500	0.51	0.20	1.01	1.07

Date	*Lat*	*Long*	*Site Use*	*Day Use*	*BLO*	*AGC*	*EDW*	*PNT*
	Location of fumigation site		Lbs of MB used per site	Total MB use for day	Santa Maria Sampling sites			
Units: concentration=ppbv; fumigant usage=lbs; coordinates=degrees								
09/14/01	34.982	-120.471	1,000					
09/14/01	34.918	-120.409	1,250					
09/15/01	34.982	-120.471	1,500	3,000				
09/15/01	34.930	-120.463	1,500					
09/16/01	34.982	-120.471	1,500	1,500	0.78			
09/17/01	34.982	-120.471	1,500	7,875	0.31	0.14	0.54	0.57
09/17/01	34.982	-120.471	5,000					
09/17/01	34.921	-120.410	1,375					
09/18/01	34.982	-120.471	1,250	5,985	0.33	0.37	0.83	
09/18/01	34.899	-120.499	1,600					
09/18/01	34.942	-120.373	3,135					
09/19/01	34.899	-120.499	800	5,442	0.42	0.30	0.49	
09/19/01	34.921	-120.410	1,250					
09/19/01	34.951	-120.407	3,392					
09/20/01	34.951	-120.407	2,708	2,708				
09/21/01	34.951	-120.407	3,977	3,977				
09/22/01	34.922	-120.398	450	4,487				
09/22/01	34.951	-120.407	4,037					
09/23/01	34.919	-120.408	1,223	28,382				
09/23/01	34.919	-120.408	11,029					
09/23/01	34.929	-120.415	12,084					
09/23/01	34.951	-120.407	4,046					
09/24/01	34.913	-120.399	1,000	6,843	2.22	0.20	4.09	1.24
09/24/01	34.922	-120.398	1,125					
09/24/01	34.951	-120.407	4,013					
09/24/01	34.915	-120.382	705					
09/25/01	34.916	-120.413	1,250	8,465	1.12		7.08	
09/25/01	34.951	-120.407	4,064					
09/25/01	34.937	-120.399	2,651					
09/25/01	34.893	-120.438	500					
09/26/01	34.913	-120.399	800	13,743	0.34	0.42	11.15	0.55
09/26/01	34.929	-120.415	3,306					
09/26/01	34.922	-120.398	1,250					
09/26/01	34.951	-120.407	3,887					
09/26/01	34.893	-120.438	500					
09/26/01	34.982	-120.471	4,000					
09/27/01	34.956	-120.472	2,125	3,375	1.20	0.72	4.05	0.83
09/27/01	34.922	-120.398	750					
09/27/01	34.893	-120.438	500					
09/28/01	34.913	-120.399	500	500				
09/29/01	34.899	-120.499	2,144	8,019				
09/29/01	34.911	-120.489	1,250					

Date	***Lat***	***Long***	***Site Use***	***Day Use***	***BLO***	***AGC***	***EDW***	***PNT***
	Location of fumigation site		Lbs of MB used per site	Total MB use for day	Santa Maria Sampling sites			
Units: concentration=ppbv; fumigant usage=lbs; coordinates=degrees								
09/29/01	34.956	-120.472	1,625					
09/29/01	34.922	-120.398	3,000					
09/30/01	34.899	-120.499	2,546	4,046	4.55		6.08	2.69
09/30/01	34.868	-120.386	1,500					
10/01/01	34.919	-120.408	285	3,525	0.24	0.90	0.38	1.98
10/01/01	34.932	-120.402	625					
10/ 01/01	34.868	-120.386	1,000					
10/01/01	34.915	-120.382	240					
10/01/01	34.920	-120.467	1,375					
10/02/01	34.919	-120.408	2,280	14,955	0.52	1.16	0.68	1.85
10/02/01	34.868	-120.386	1,875					
10/02/01	34.913	-120.399	10,800					
10/03/01	34.919	-120.408	1,140	4,565	0.24	0.48	0.22	1.43
10/03/01	34.932	-120.402	125					
10/03/01	34.868	-120.386	1,250					
10/03/01	34.942	-120.373	1,250					
10/03/01	34.913	-120.399	800					
10/04/01	34.919	-120.408	1,140	5,312				
10/04/01	34.923	-120.415	47					
10/04/01	34.867	-120.351	1,625					
10/04/01	34.868	-120.386	2,500					
10/05/01	34.923	-120.415	938	5,163				
10/05/01	34.868	-120.386	1,875					
10/05/01	34.868	-120.386	300					
10/05/01	34.942	-120.373	1,250					
10/05/01	34.913	-120.399	800					
10/06/01	34.919	-120.408	912	4,350	0.58	0.08	0.36	0.82
10/06/01	34.923	-120.415	938					
10/06/01	34.868	-120.386	2,500					
10/07/01	34.923	-120.415	938	14,338	0.52	0.21		0.93
10/07/01	34.868	-120.386	1,250					
10/07/01	34.868	-120.386	900					
10/07/01	34.970	-120.457	10,000					
10/07/01	34.942	-120.373	1,250					
10/08/01	34.899	-120.499	2,680	3,618	0.21	0.17	0.26	0.21
10/08/01	34.923	-120.415	938					
10/09/01	34.899	-120.499	2,680	6,768	1.04	0.39	0.82	2.26
10/09/01	34.923	-120.415	938					
10/09/01	34.868	-120.386	1,400					
10/09/01	34.942	-120.373	1,750					

Oxnard/Camarillo Data Interpretation

Period Wind Rose

The wind rose for the entire study period shows that the majority (>40%) of the time, the wind direction is on-shore from the west to southwest, with the second most common direction coming from the north to north-northwest sectors. This corresponds with the typical on-shore/off-shore pattern seen in coastal areas. A time series plot of the daily data shows that the on-shore south west direction dominates from mid-morning to evening, with the remainder of the day being more random with out one clear pattern.

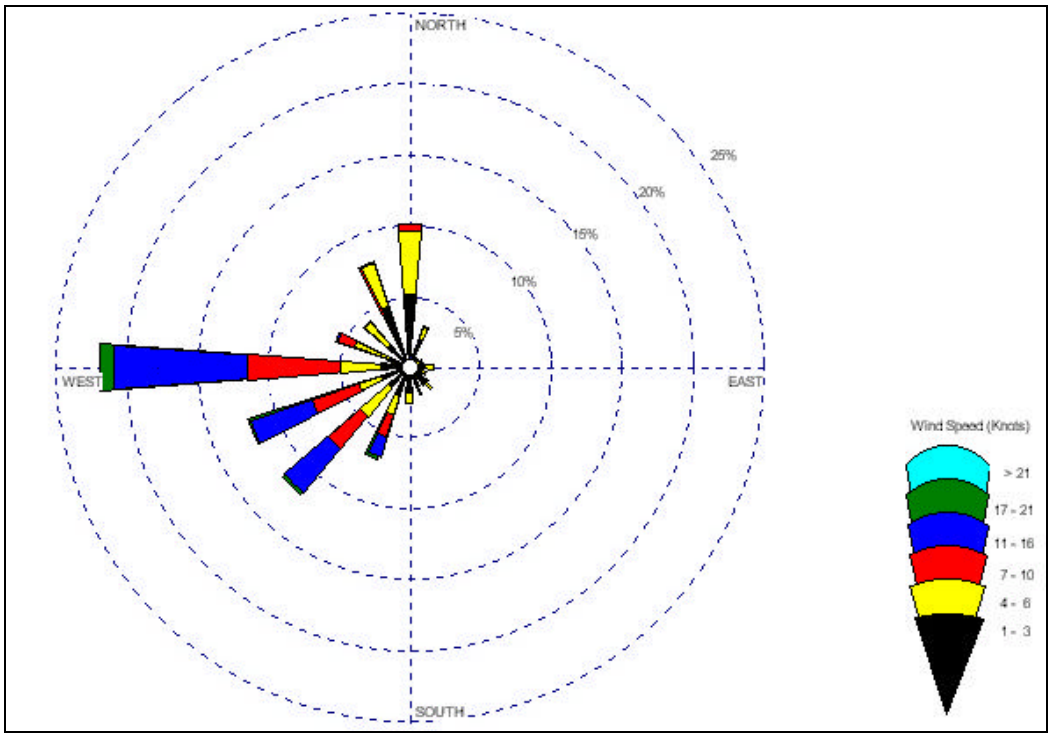


Figure 12. Study Period Wind Rose
(note that wind speeds are in mph instead of knots for the data in this plot)

The implications for this study of this pattern is that fumigations occurring in the predominately agricultural areas south to southwest of Camarillo will tend to impact the population in that area.

A plot of the fumigations conducted in the study period is contained in Figure 13 and shows the distribution of the 2001 usage. This pattern is consistent with past representations of the data, but is more specific to actual locations instead of townships and sections. In this plot, some of the fumigation data are superimposed since many fumigations are performed in smaller sections over several days that are reported only for

the one main location. In addition, the resolution of the information on location is poor because of the limited description available in the pesticide use report data base.

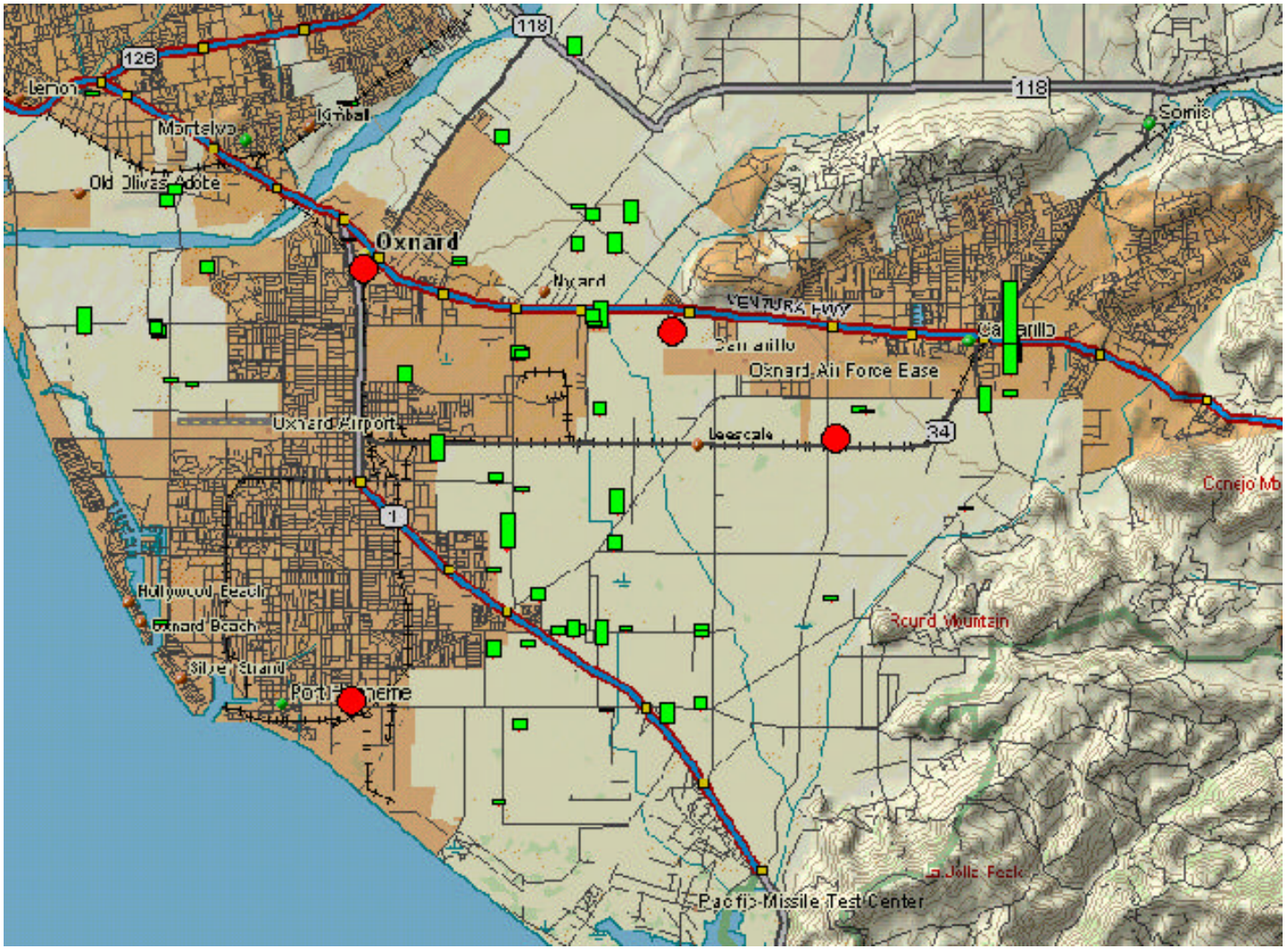


Figure 13. Plot of all fumigations during study period.
The green bars are proportional to the amount used. Red points are the sampling locations.

Given that the wind direction is predominately out of the west, when one examines the potential trajectory of emission plumes, it is seen that populated areas are not to be found downwind for the majority of the fumigation sites. The major areas are the central area south-east of Camarillo and east of Oxnard, and the concentrated areas along Route 101 near the border of Oxnard and Camarillo and to the east of the Route 101 and Route 34. Directly to the east of these areas, there are only small pockets of population.

Given these long-term trends, the examination of the medians for specific sites is instructive.

Table 19 contains the median concentrations calculated as described previously.

Table 21. Median Concentrations at Sampling Sites

Site	Median
PVW	0.28
UWC	0.33
SHA	0.22
ABD	0.12

Units: ppbv

The PVW site was located at the northeast end of the central Pleasant Valley area between Oxnard and Camarillo. This location was downwind of a large amount of fumigant application. Similarly, site UWC was downwind of a number of applications.

For examination of all the sites, it is important to determine if the four different sampling locations were statistically different, thereby eliminating the spatial variable for larger averages. Using both a simple graphical representation of the medians along with the upper and lower 95% confidence limits as shown in Figure 14, a visual indication is that the four locations are not different based on the variability in the data sets. The nonparametric Kruskal-Walls test for k-independent means also confirms that these individual locations are not significantly different.

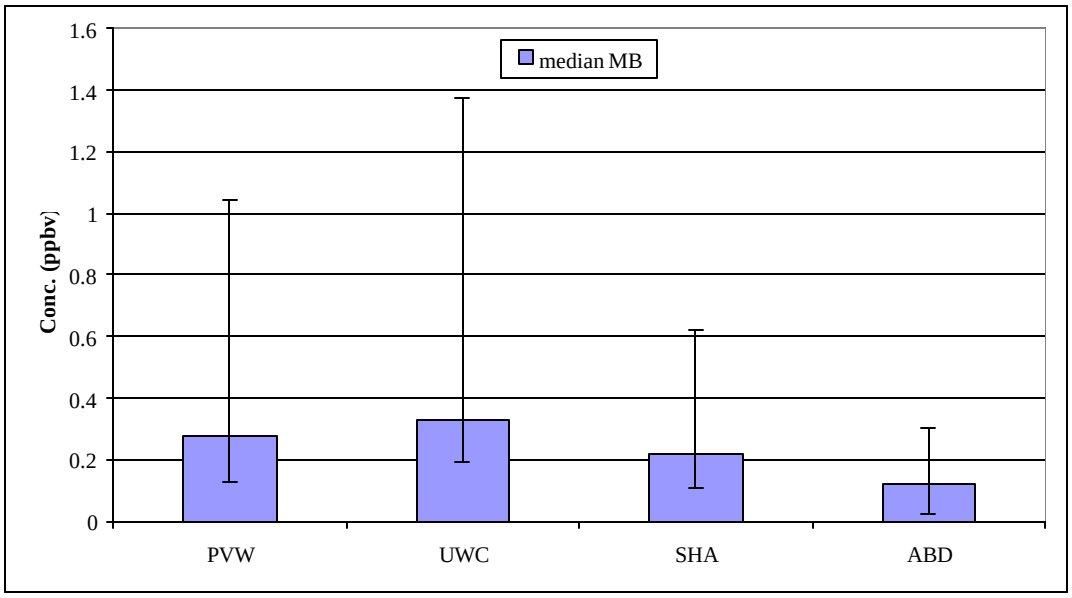


Figure 14. Plot of medians and 95% confidence intervals for Oxnard/Camarillo sites.

Santa Maria Data Interpretation

The wind rose for Santa Maria indicated in Figure 15 shows that the wind flow is from the northwest for the majority of the time. The implication is that fumigations occurring on the northwest side of town will have the most impact to the community.

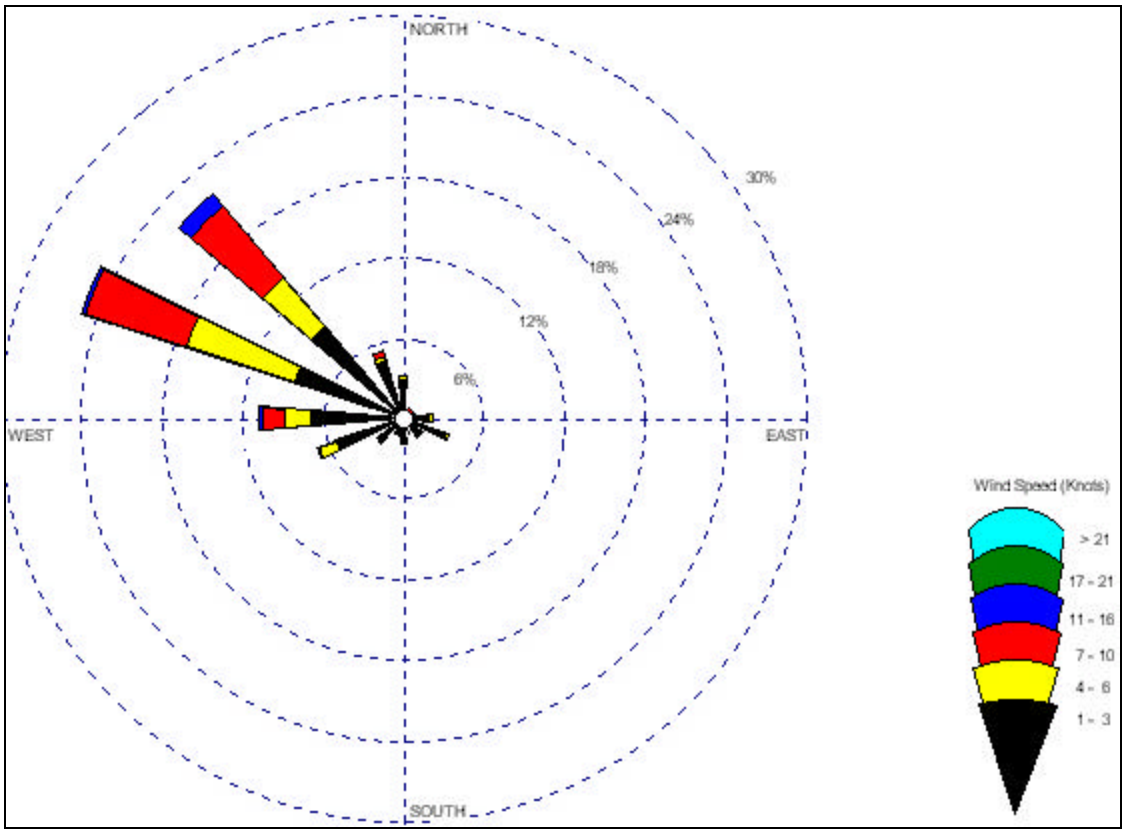


Figure 15. Study Period Wind rose for Santa Maria

The majority of the fumigations that are occurring on the eastern side of Route 101would impact a much lower population due to the sparse residential development in that area. Figure 16 contains a plot of all the fumigations for the study period. Some usages are superimposed on the same location due to the manner of reporting, as discussed above.

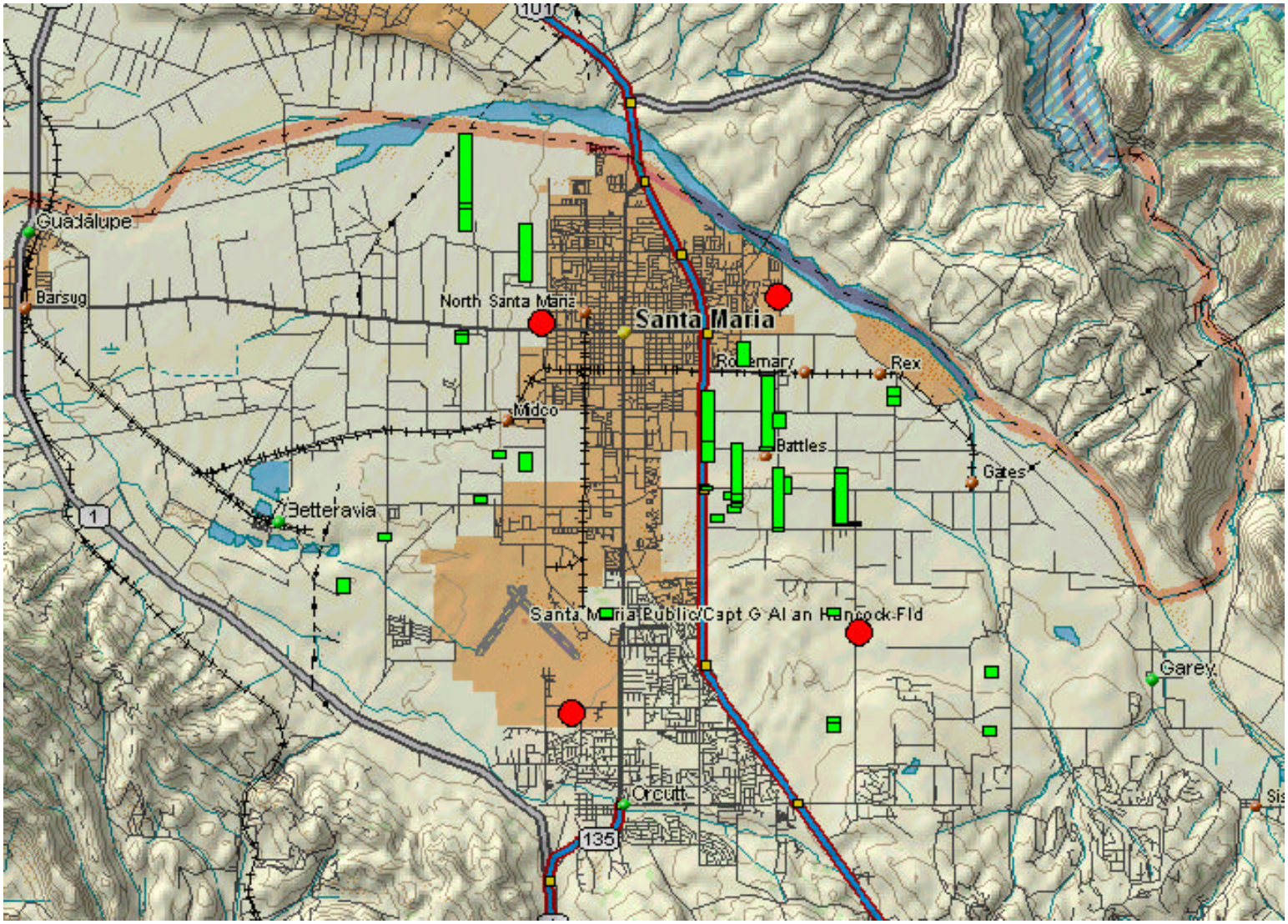


Figure 16. Santa Maria Fumigation Locations
Green bars are proportional to amount of methyl bromide used; red dots are sampling locations.

Table 21 contains the entire study period means.

Site	Mean
BLO	0.58
AGC	0.27
EDW	0.81
PNT	0.89

Units: ppbv

Table 21. Means for Santa Maria

A bar chart with the 95% confidence interval of the study period averages shown in Figure 17 suggests that from a statistical basis, due to the very large confidence bands, the four sites would be considered equivalent. However, since the majority of the variability is due to spatial aspects that are affected by meteorology and the highly variability location of the fumigation sites, the four sites are not that similar. In particular, the AGC site is isolated from the majority of the fumigations, and therefore was not affected over the longer term by all the usage. The EDW and PNT sites are essentially identical due to the measured values, plus considering their location. The BLO site appears to have been affected primarily by fumigations occurring to the northwest of that site.

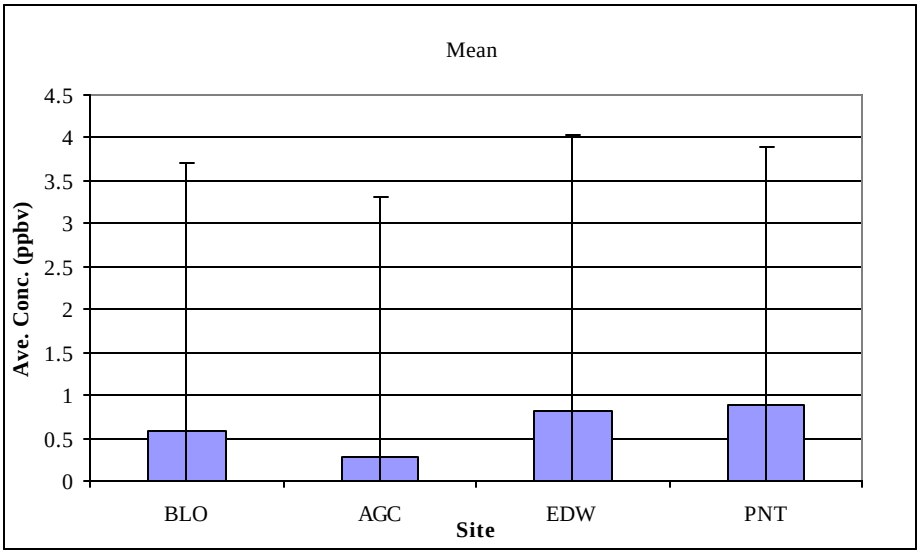


Figure 17. Bar chart of Santa Maria Concentrations

Data Interpretation--Weekly Periods of Fumigation Data, Concentration, and Meteorology

The study design was for four days a week spread randomly over eight weeks. Statistical calculations were performed on the grouped data, as described above. However, when comparing these grouped data with the daily fumigation records, this design shows it to be of little assistance in unraveling the association between fumigations and ambient air concentrations.

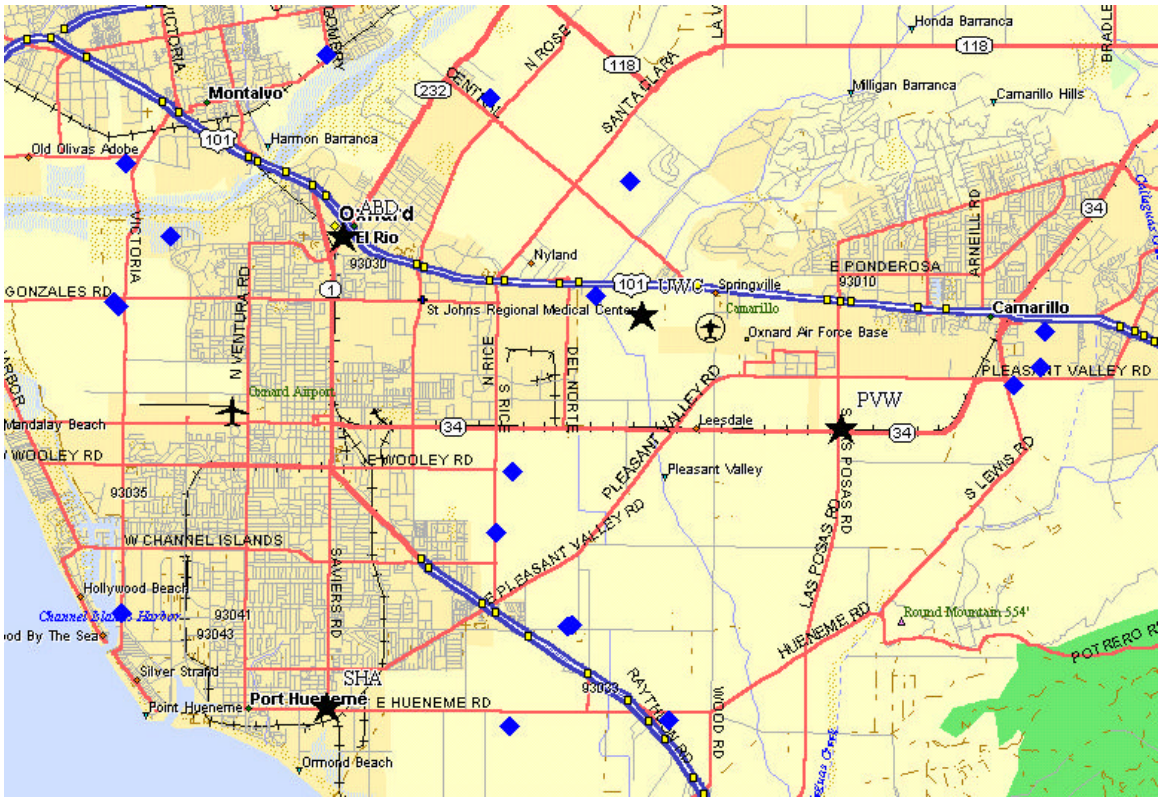
For the attempts at understanding the association between sets of fumigation and the ambient concentrations, other groups were created that combined the fumigation periods and the samples collected. These new groups are similar to the sampling groups, but in some cases there is overlap between two groups. The starting point of each group was formed by examining the daily fumigation records and starting a group three days prior to the first sample collection. The end point of the group was considered the day after the sample started. In all the tables, the date noted is the start date, but in many cases, a portion of the following day was sampled and emissions from a fumigation prior to that time would still be available for capture. Some periods overlapped since fumigations from one period would continue to affect the samples in the next period.

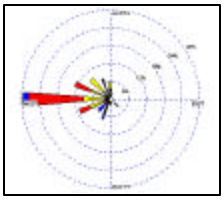
The data from these groups were used for primarily showing a graphic relationship between a particular fumigation activity, meteorological data and measured concentrations.

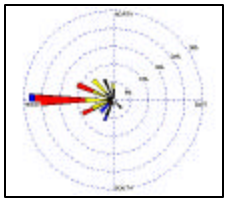
The data contained in Tables 19 and 20 show the groupings used for the following graphics. One section per grouping contains a map of the area with fumigant usage locations noted with a blue diamond. Individual graphics are not labeled in these groupings, but each page has identical elements—a graphic of the area with individual fumigations marked, micromet wind roses from each of the sampling sites, and a table with the locations, amount of methyl bromide usage, and the ambient concentrations during that time.

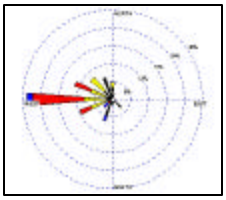
Data Groupings—Oxnard/Camarillo

August 13-18, 2001









ABD	SHA	UWC	PVW

Date	*Lat*	*Long*	*Day Total*	*PVW*	*UWC*	*SHA*	*ABD*
08/13/01	34.220	-119.121	23,347				
08/14/01	34.179	-119.143	35,542				
08/15/01	34.145	-119.140	19,016	1.82	2.58	0.69	
08/16/01	34.214	-119.026	8,291	1.05	1.85	0.17	
08/17/01				3.17	1.80	0.18	
08/18/01	34.204	-119.033	35,992				

The data for this period and the next are the most important for Oxnard/Camarillo since the highest concentrations were found during this time.

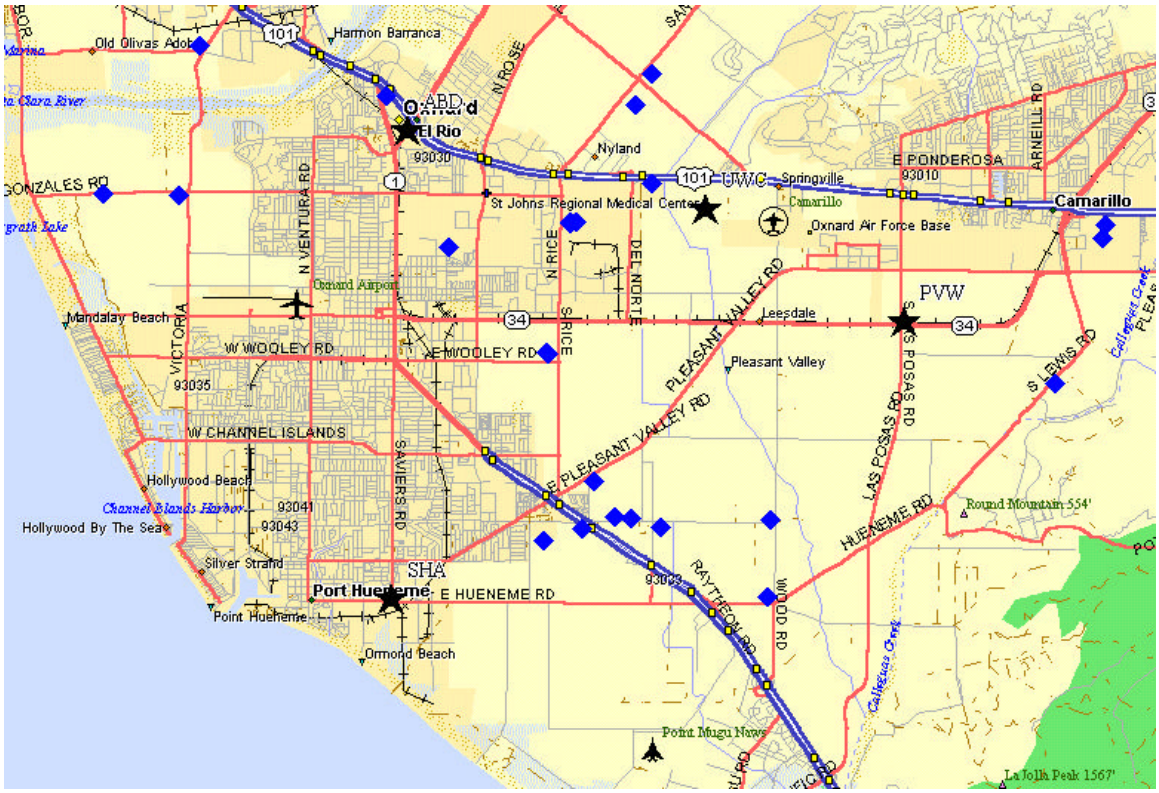
The data suggest that the UWC site was impacted by the fumigations occurring to the west. That area is barely outside of the boundaries set in the work plan for consideration of being source-impacted, although this data would suggest that it was source impacted. The wind was coming directly and consistently out of the west from the fumigation site toward the monitoring location. Indeed, field crew observations were made of fumigations occurring during the sampling period.

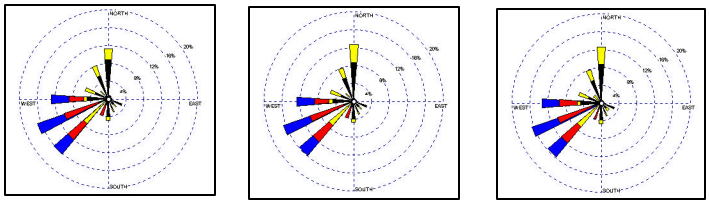
Of any site to be potentially considered to be source impacted, the UWC site would be the candidate.

The high values for PVW appear to be a result of the four fumigation sites to the WSW of the site.

The low levels at the SHA site during this time suggests the weakness of the off-shore breeze that would transport the emissions to that area.

August 19-24, 2001





SHA	UWC	PVW

Date	*Lat*	*Long*	*Day Total*	*PVW*	*UWC*	*SHA*	*ABD*
08/19/01	34.219	-119.239	32,233				
08/20/01	34.210	-119.166	33,445				
08/21/01	34.219	-119.223	9,903	0.50	1.53	0.28	
08/22/01	34.161	-119.121	61,318	1.91	0.45		
08/23/01	34.162	-119.127	10,633	2.49	4.35	2.94	
08/24/01	34.169	-119.135	25,721	1.44	2.01	3.38	

The data for this period are also suggestive of the same considerations as the previous, although the highest fumigation usage occurred further away from UWC during this period.

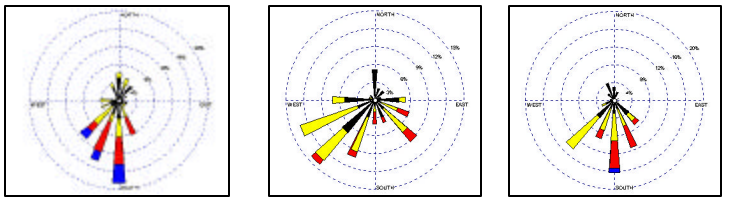
The highest study value occurred on August 23 at UWC at 4.35 ppbv. The explanation for this value appears to be due to the larger number of fumigations occurring throughout the area along with the total amount being used as no major usage occurred to the west of the site.

PVW appears again to be impacted by sites to the west, but the high usage to the east may contribute during off-shore flow, as is shown in the SHA data.

The high values at SHA are suggestive that the larger number of fumigations occurring to the east of that site are impacting that area in the evening off-shore flow. This is in contrast to the previous period in which the off-shore flow did not lead to a high contribution at SHA. A similar mechanism appears to be operative for PVW. Both these observations are suggestive of a sort of a potential threshold effect.

This week was the period of highest fumigant usage, so the entire region was suffused with the emissions from the fumigations, suggesting that detailed analysis of the impact from one site or the other may not be fruitful.

August 25-31, 2001

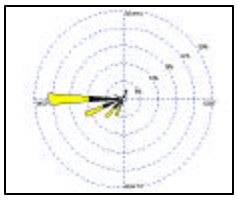


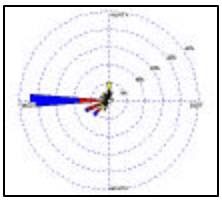
SHA UWC PVW

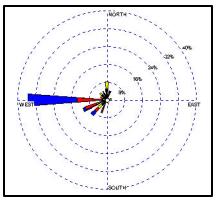
Date	*Lat*	*Long*	*Day Total*	*PVW*	*UWC*	*SHA*	*ABD*
08/25/01	34.162	-119.131	6,080	0.81	0.25	1.09	
08/26/01	34.235	-119.126	27,638				
08/27/01							
08/28/01				0.12	0.21	1.09	
08/29/01	34.219	-119.223	5,775	0.15	0.10	0.07	
08/30/01	34.210	-119.220	2,904	0.28	0.35	0.56	0.44
08/31/01	34.185	-119.117	12,271	0.15	0.18		

The data from this period suggests that the area of influence for the fumigations occurring in the central areas is approximately two miles. The higher values at PVW and SHA appear to be due to that central area. The other sites were not impacted significantly. With no fumigations nearby, but with several in a 2-3 mile radius, the ABD site shows a typical concentration that appears at this fumigant usage level.

September 4-9, 2001







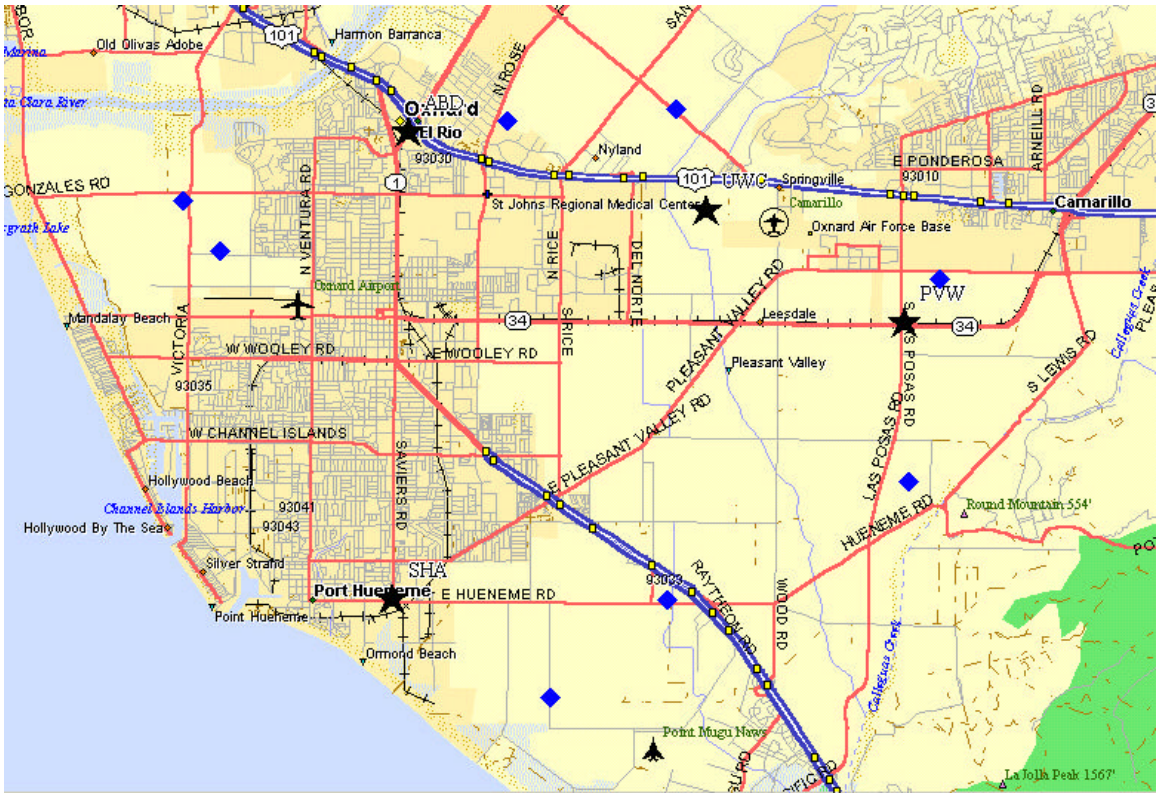
ABD	SHA	UWC	PVW

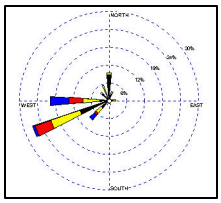
Date	*Lat*	*Long*	*Day Total*	*PVW*	*UWC*	*SHA*	*ABD*
09/04/01	34.214	-119.139	11,061				
09/05/01							
09/06/01	34.220	-119.122	168	0.20		0.04	0.05
09/07/01	34.165	-119.222	461	0.10		0.03	0.13
09/08/01	34.218	-119.223	9,315	0.07		0.05	0.13
09/09/01	34.253	-119.143	9,490	0.16		0.23	0.39

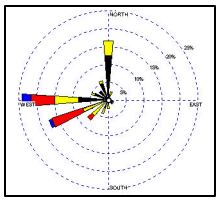
With fumigant usage dropping compared to previous weeks, the data from this period shows low levels, some at background. Data from the UWC site was not collected due to a fumigation occurring directly adjacent to the site, which would have severely compromised those samples. Per the work plan, these samples were skipped.

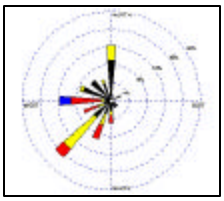
The remainder of the periods show nothing remarkable. The concentrations drop significantly, many to close to background levels. There do not appear to be any source-impacted samples during this time frame.

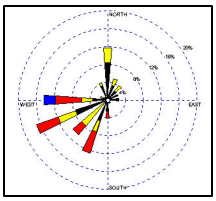
September 11-15, 2001







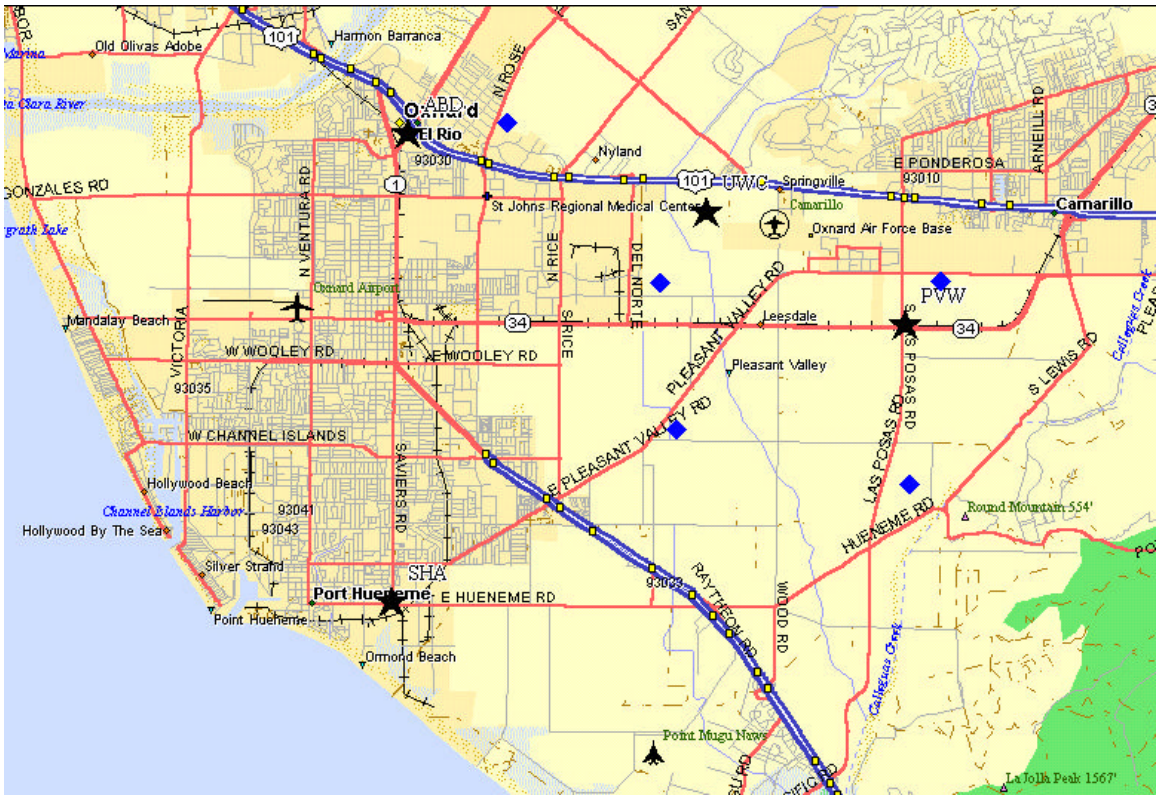


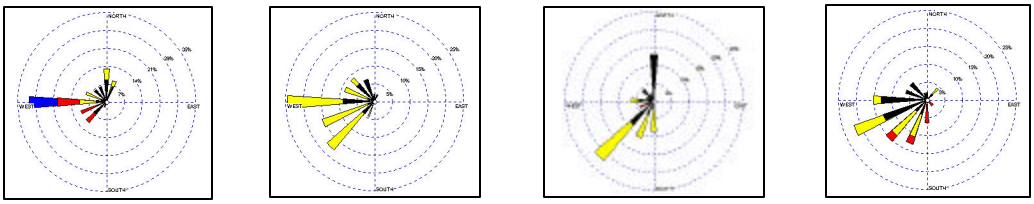


ABD	SHA	UWC	PVW

Date	*Lat*	*Long*	*Day Total*	*PVW*	*UWC*	*SHA*	*ABD*
09/11/01	34.234	-119.118	18,967				
09/12/01	34.209	-119.215	1,271				
09/13/01				0.17	0.07	0.38	0.07
09/14/01				0.15	0.05	0.07	0.10
09/15/01	34.218	-119.223	193	0.20	0.14	0.13	0.15

September 16-20, 2001

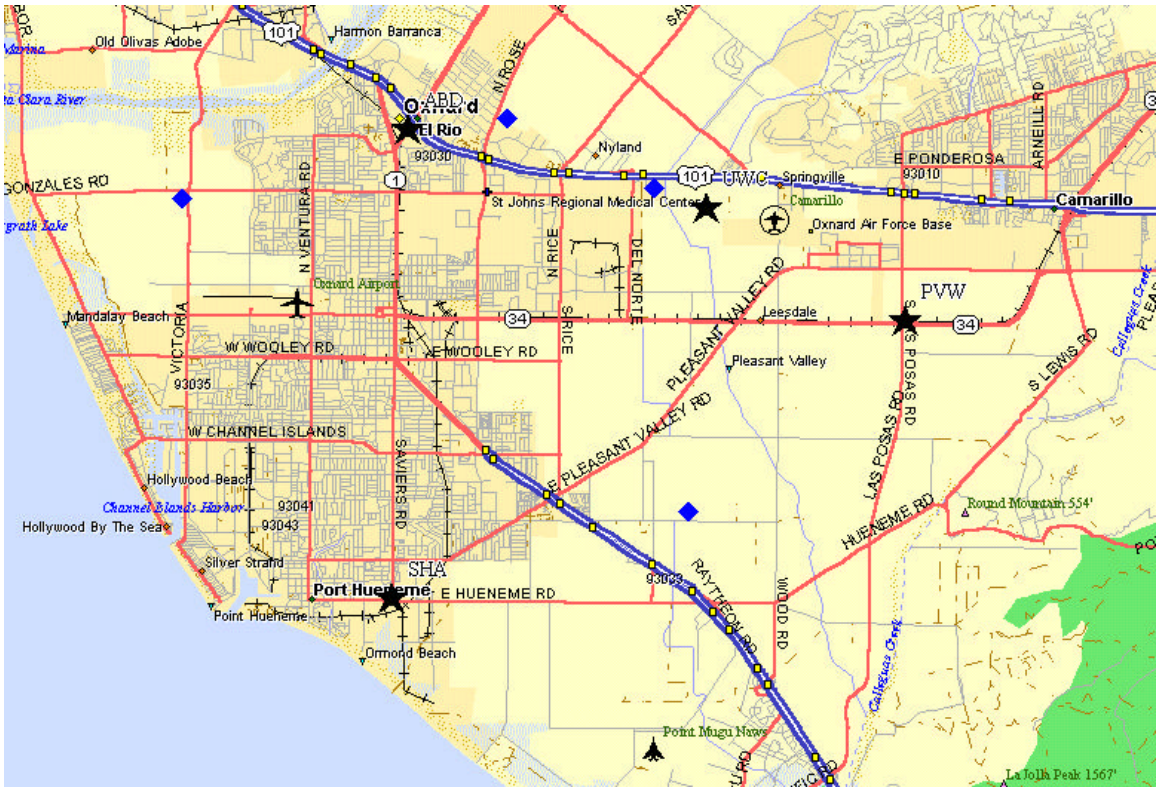


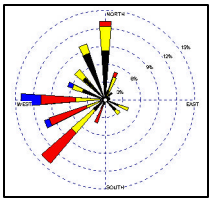


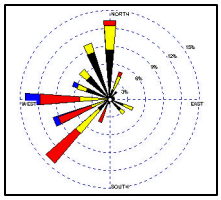
ABD	SHA	UWC	PVW

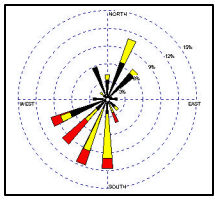
Date	*Lat*	*Long*	*Day Total*	*PVW*	*UWC*	*SHA*	*ABD*
09/16/01	34.232	-119.154	441	0.29	0.06	0.11	0.11
09/17/01	34.169	-119.068	2,830	0.35	0.07	0.13	0.14
09/18/01	34.232	-119.154	1,176				
09/19/01				0.18	0.18	0.10	0.10
09/20/01	34.204	-119.121	14,275	0.59	0.30	0.36	0.11

September 23-October 1, 2001





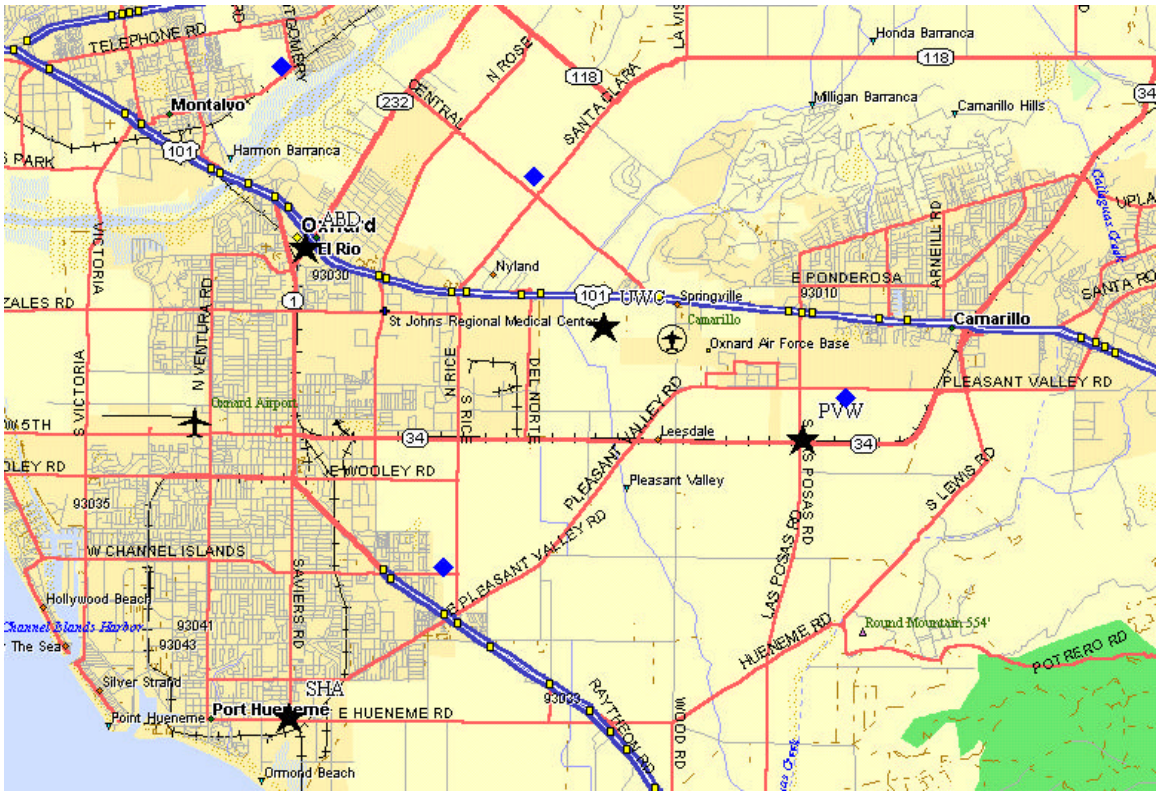


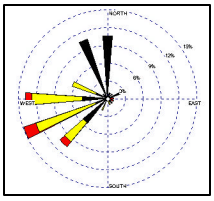


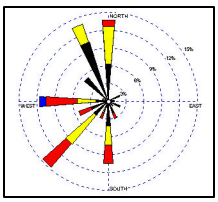
ABD	SHA	UWC	PVW

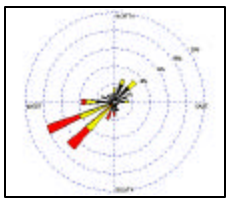
Date	*Lat*	*Long*	*Day Total*	*PVW*	*UWC*	*SHA*	*ABD*
09/23/01	34.232	-119.154	1,288				
09/24/01	34.232	-119.154	368				
09/25/01							
09/26/01	34.232	-119.154	1,103	0.17	0.60	0.45	0.25
09/27/01				0.08		0.09	0.12
09/28/01	34.220	-119.122		0.08		0.10	0.15
09/29/01	34.218	-119.223	552	0.11		0.19	0.19
09/30/01				0.15		0.07	0.06
10/01/01	34.220	-119.122	549				

October 5-10, 2001







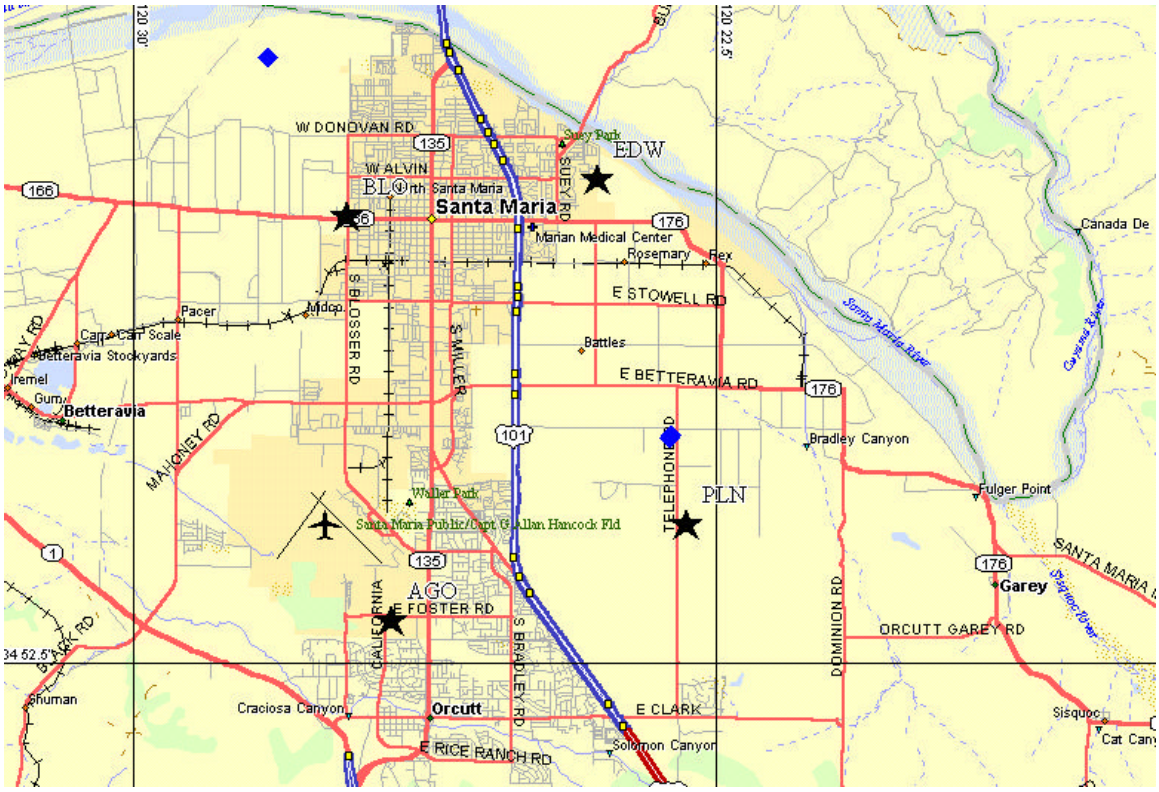


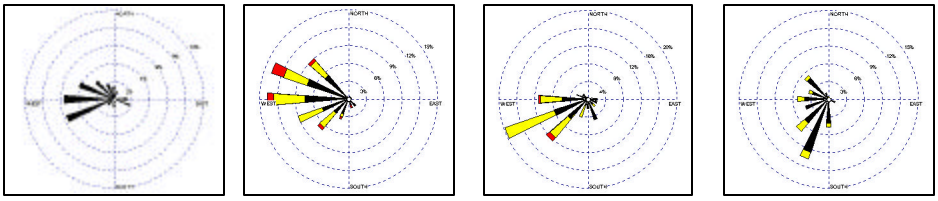
ABD	SHA	UWC	PVW

Date	*Lat*	*Long*	*Day Total*	*PVW*	*UWC*	*SHA*	*ABD*
10/05/01	34.243	-119.126	171				
10/06/01	34.174	-119.146	1,534				
10/07/01				0.06	0.07	0.10	0.04
10/08/01				0.05	0.05	0.05	0.06
10/09/01				0.09	0.07	0.07	0.10
10/10/01				0.10	0.07	0.11	0.11

Santa Maria Data

August 20-28, 2001



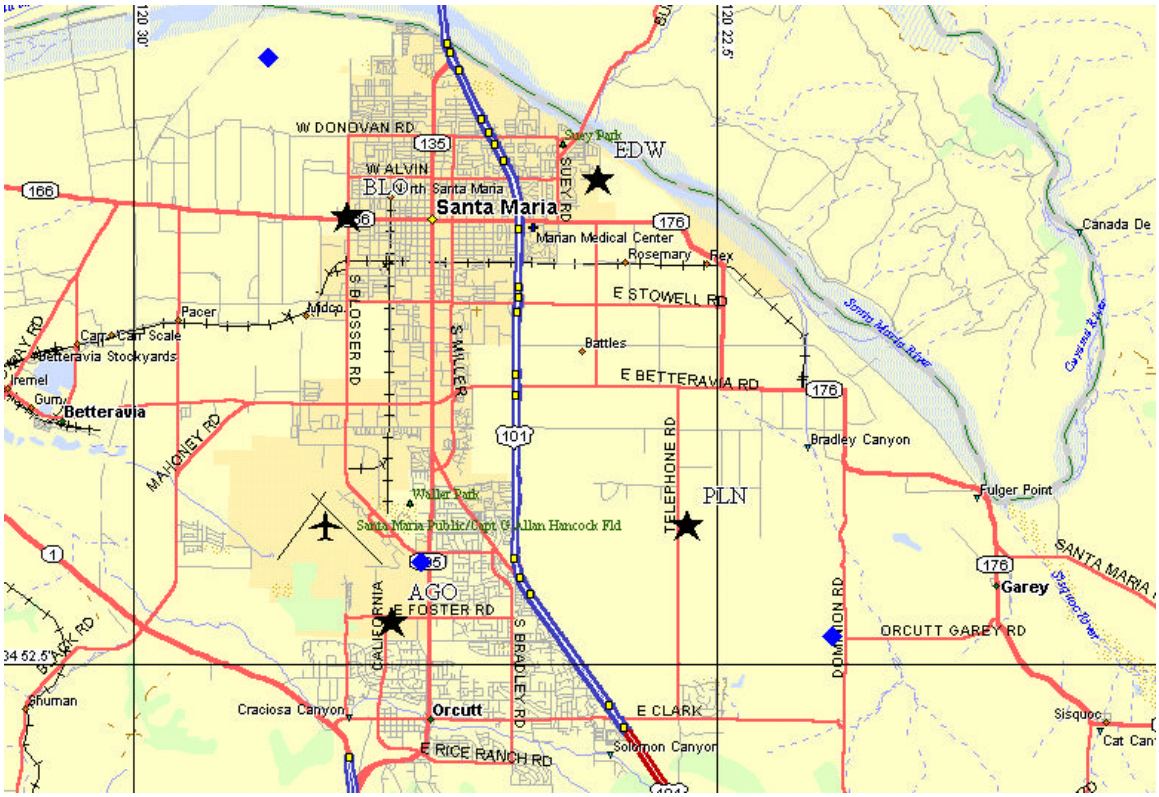


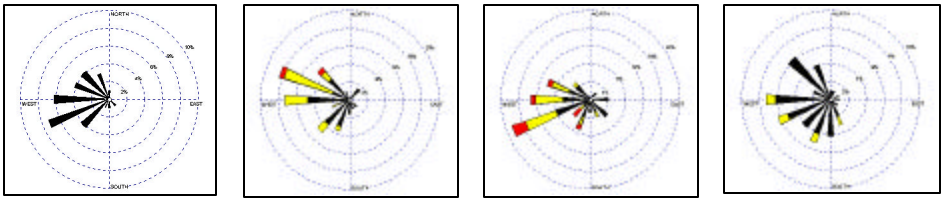
AGC	BLO	EDW	PNT

Date	*Lat*	*Long*	*Day Total*	*BLO*	*AGC*	*EDW*	*PNT*
8/20/01	34.91517	-120.3845	9,600				
8/21/01							
8/22/01							
8/23/01				0.04	0.03	0.02	
8/24/01	34.98167	-120.470833	1,375	0.03	0.13	1.02	
8/25/01	34.98167	-120.470833	1,875	0.68	0.11	0.69	
8/26/01	34.98167	-120.470833	2,500	3.46	0.13	1.33	0.34
8/27/01	34.98167	-120.470833	8,661	2.09	0.14	0.98	0.68
8/28/01	34.98167	-120.470833	10,275	0.19	0.06	0.44	0.10
8/29/01	34.98167	-120.470833	1,250	0.34	0.02	0.32	1.29
8/30/01	34.98167	-120.470833	625	0.30	0.06	0.58	1.68
8/31/01	34.98167	-120.470833	1,125				

The data during this period is instructive about what emission plume behavior is during fumigant use in a localized area. During this period, the majority of the usage was in the area approximately 2 miles northwest of the BLO site at 34.9817 and –120.470. The concentrations at both BLO and EDW suggest that the plume from that site is directly impacting both sites, with a dilution factor occurring between BLO and EDW directly downwind approximately 4.5 miles to the east from the fumigation area. The other fumigation occurring is north of PNT, which appears to have only slightly affected that value. The concentrations at AGC are indicative of a general dispersion to the region.

September 1-7, 2001





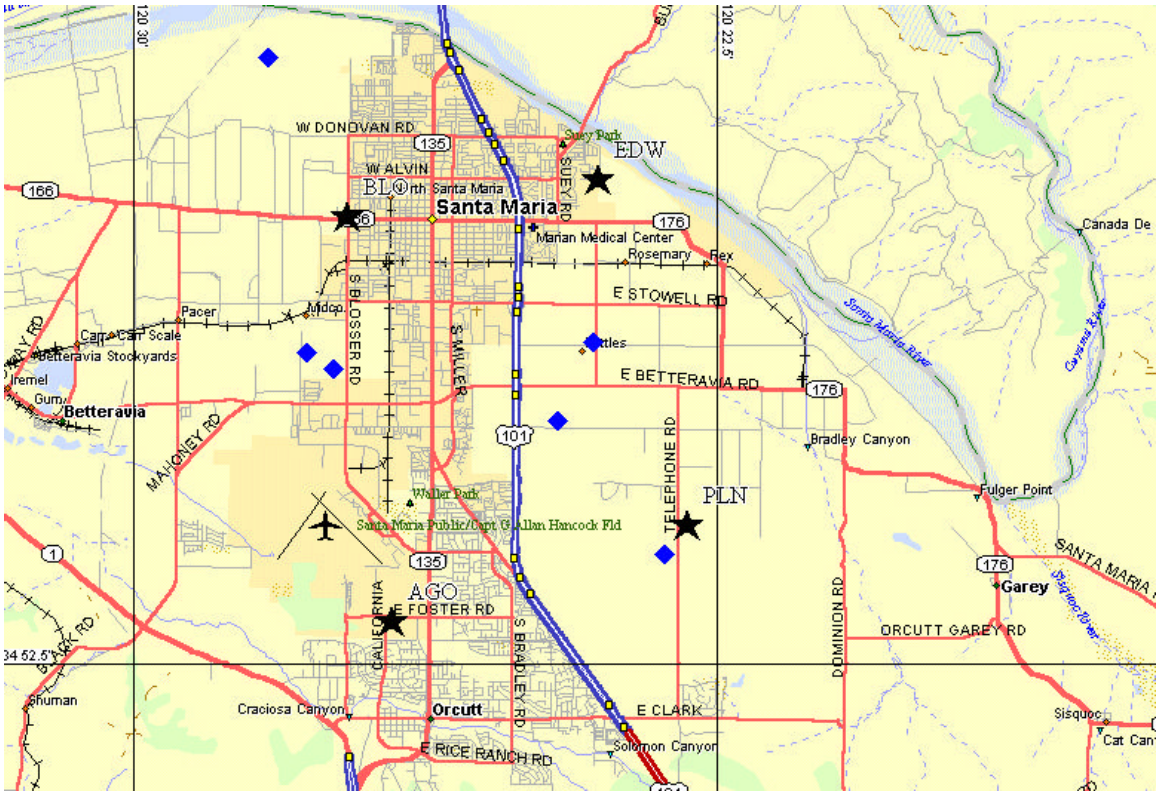
AGC	BLO	EDW	PNT

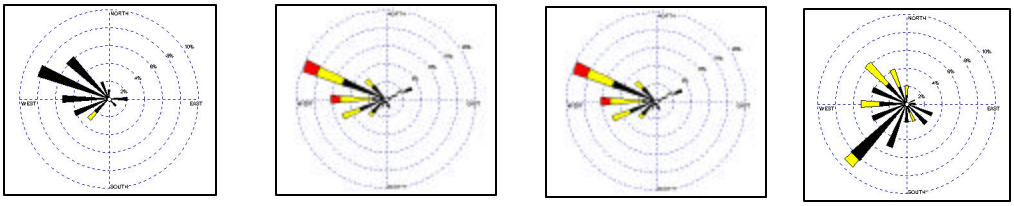
Date	*Lat*	*Long*	*Day Total*	*BLO*	*AGC*	*EDW*	*PNT*
9/1/01	34.98167	-120.470833	3,961				
9/2/01	34.98167	-120.470833	16,500				
9/3/01	34.98167	-120.470833	1,375				
9/4/01	34.98167	-120.470833	1,375	0.07	0.05	0.30	0.22
9/5/01	34.98167	-120.470833	2,625	0.17	0.05	0.09	0.43
9/5/01	34.88	-120.350167					
9/6/01	34.98167	-120.470833	2,625	0.21	0.13	0.59	0.51
9/6/01	34.88	-120.350167					
9/7/01	34.88	-120.350167	1,875	0.11		0.20	

The concentrations during this period are fairly low, except for one value at EDW that was curiously high given the absence of usage in that area and the absence of a high value at BLO that would have indicated emissions from the area northwest of BLO. The

usage near the airport on 9/6 appears to have impacted AGC slightly. This set of data suggests t hat there is a sort of threshold effect to long-range impacts.

September 9-14, 2001



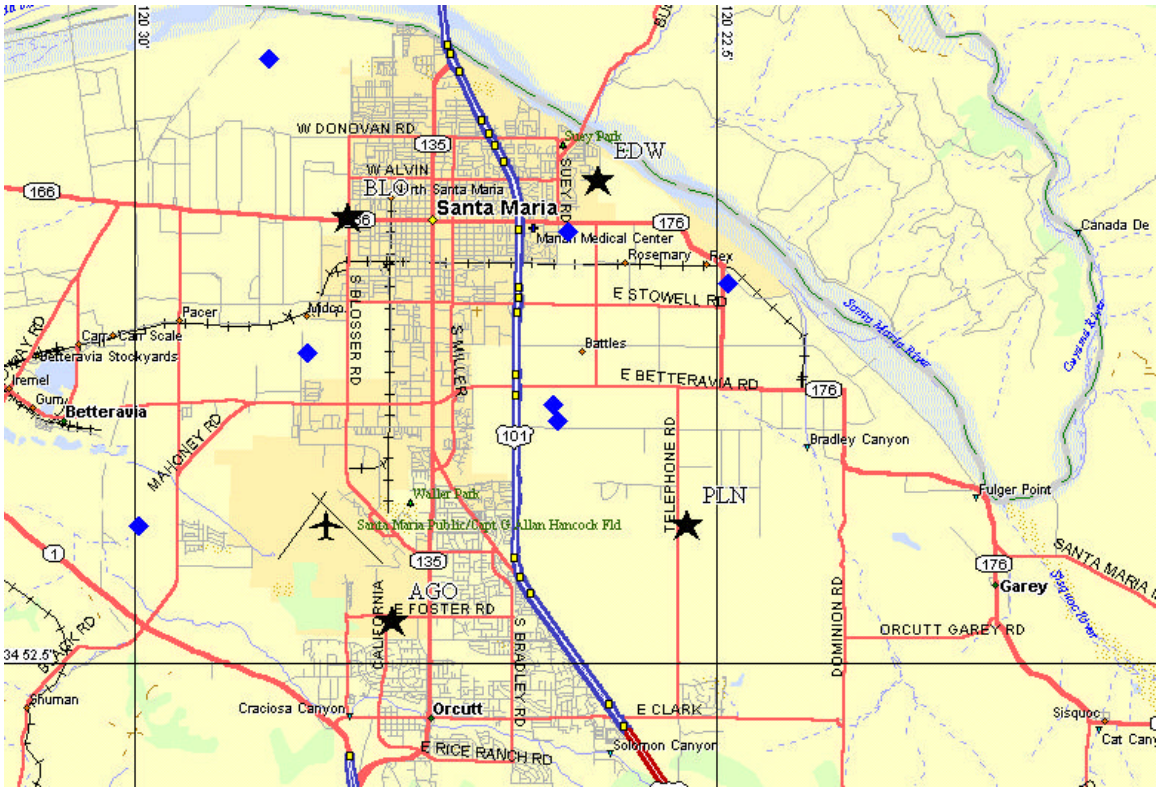


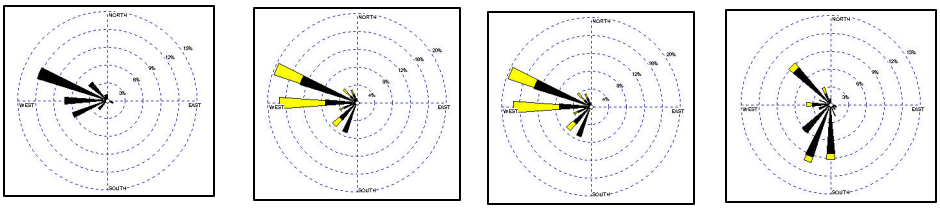
AGC	BLO	EDW	PNT

Date	*Lat*	*Long*	*Day Total*	*BLO*	*AGC*	*EDW*	*PNT*
9/9/01	34.92688	-120.457	3,325				
9/10/01	34.89433	-120.386167	1,250				
9/11/01	34.98167	-120.470833	1,000	1.47	0.15	1.30	1.81
9/12/01	34.98167	-120.470833	14,972		0.21	0.68	0.78
9/13/01	34.98167	-120.470833	1,000	0.40	0.21	0.64	0.59
9/14/01	34.98167	-120.470833	3,500	0.51	0.20	1.01	1.07

The BLO and EDW sites appears to have been impacted by the usages to the NW of BLO. PNT was affected by a usage to the southwest. The proximity that fumigation (approximately one mile) and the low amount used (1,250 lbs) suggests a source impact to that sample. As previously, the high level at BLO and EDW appear to have been due to the NW of BLO usage.

September 15-20, 2001



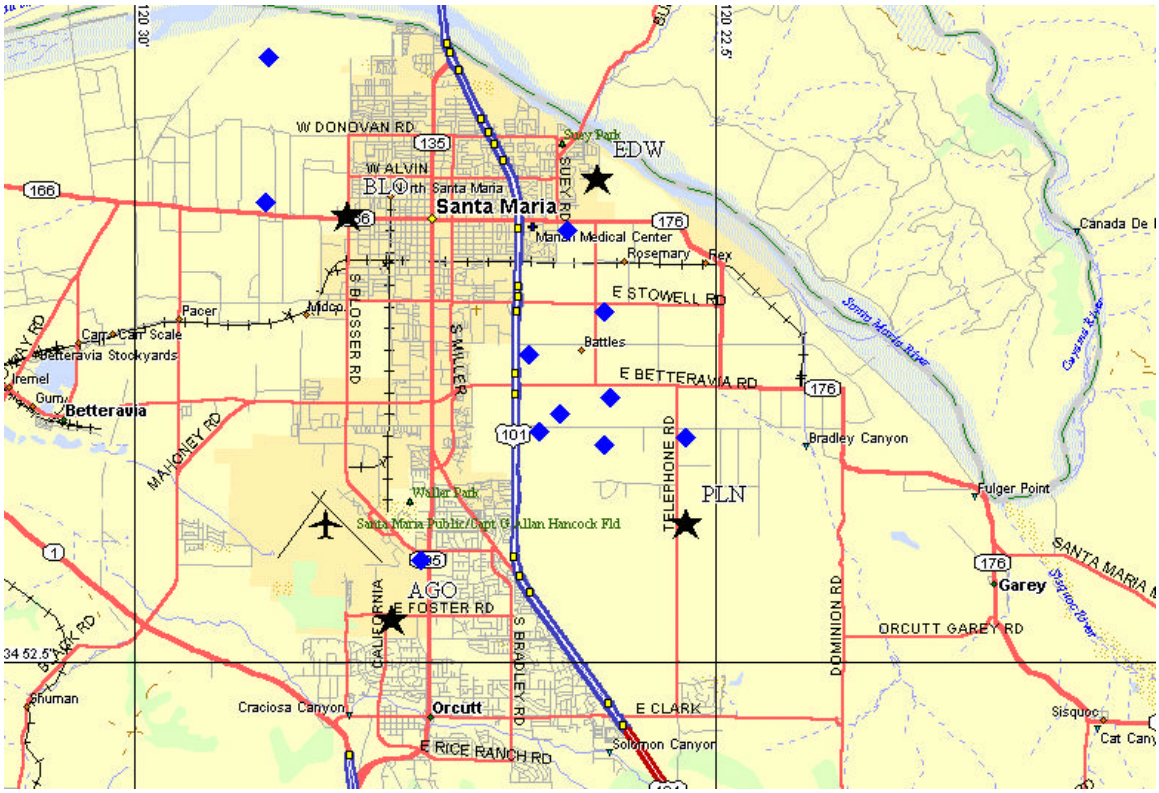


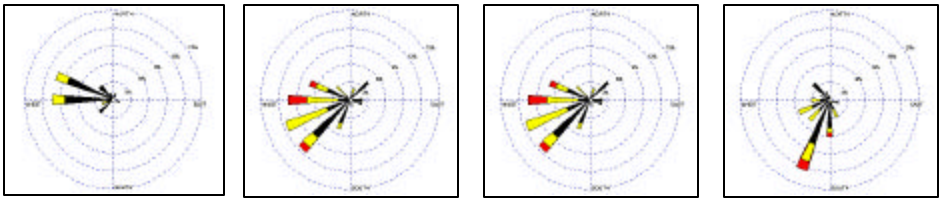
AGC	BLO	EDW	PNT

Date	*Lat*	*Long*	*Day Total*	*BLO*	*AGC*	*EDW*	*PNT*
9/15/01	34.981667	-120.4708333	3,000				
9/16/01	34.981667	-120.4708333	1,500	0.78			
9/17/01	34.981667	-120.4708333	7,875	0.31	0.14	0.54	0.57
9/18/01	34.981667	-120.4708333	5,985	0.33	0.37	0.83	
9/19/01	34.899167	-120.4988333	5,442	0.42	0.30	0.49	
9/20/01	34.951133	-120.40695	2,708				

The higher levels at BLO again appear to be due to the impact from the areas NW of that site. PNT appears to be affected by the usages to the NW of that site, which may also affect EDW to some degree.

September 21-27, 2001





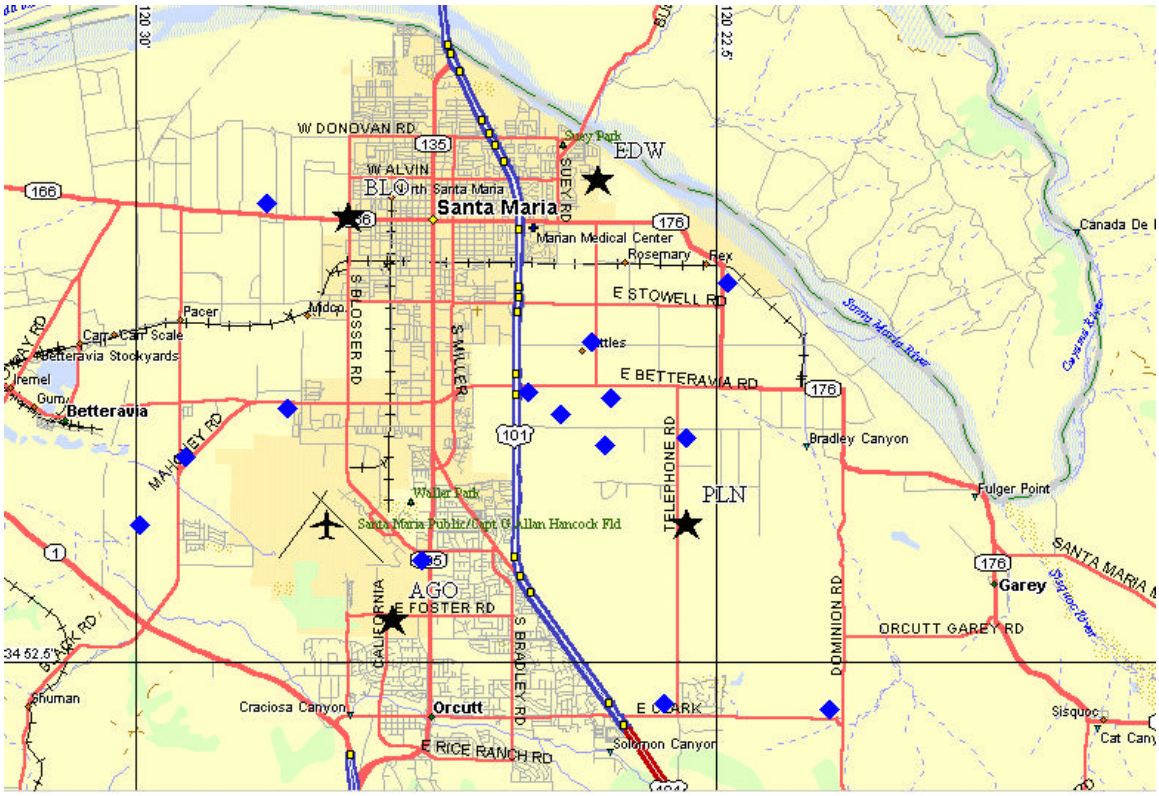
AGC	BLO	EDW	PNT

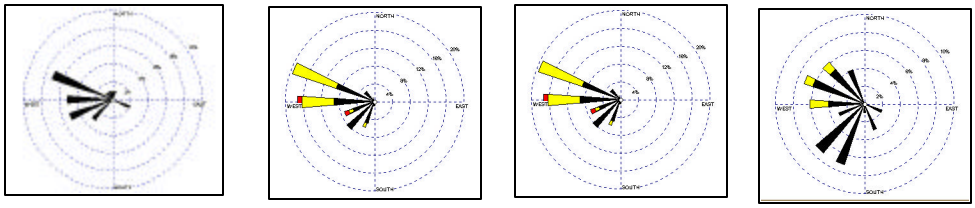
Date	*Lat*	*Long*	*Day Total*	*BLO*	*AGC*	*EDW*	*PNT*
9/21/01	34.951133	-120.40695	3,977				
9/22/01	34.921717	-120.3976167	4,487				
9/23/01	34.918717	-120.4084667	28,382				
9/24/01	34.913333	-120.399	6,843	2.22	0.20	4.09	1.24
9/25/01	34.9156	-120.4129833	8,465	1.12		7.08	
9/26/01	34.913333	-120.399	13,743	0.34	0.42	11.15	0.55
9/27/01	34.956167	-120.4715	3,375	1.20	0.72	4.05	0.83

The highest value of the study was 11.1 ppbv at EDW on September 26. This is likely due to the fumigations occurring both nearby (within 0.6 mi) and the continuing use NW of BLO. This suggests that the 11.1 ppbv value along with the previous days' high values are substantially source-impacted. The relative impact to EDW at 11.1 ppbv from the nearby fumigation compared to the more remote locations is seen by the low level

seen at BLO of 0.34 ppbv September 26. This suggests that some portion, likely up to half, of that high value is due to the source-impacted data.

September 28-October 3, 2001



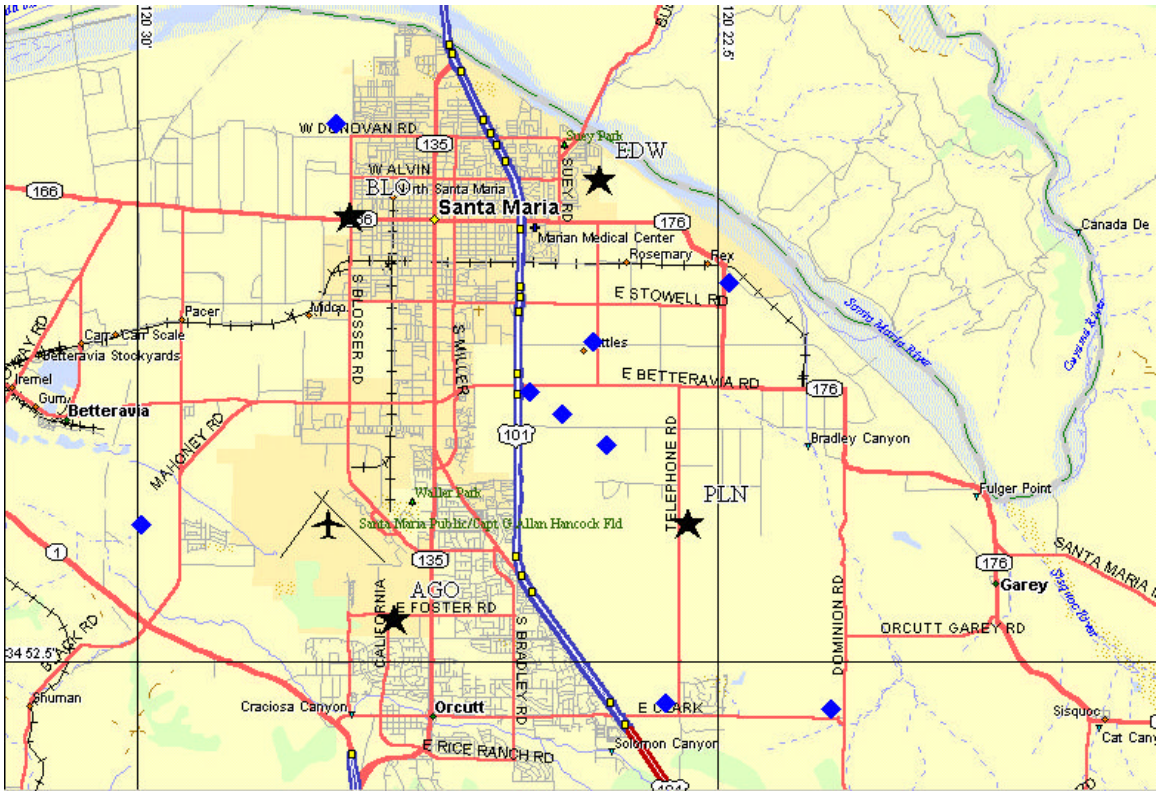


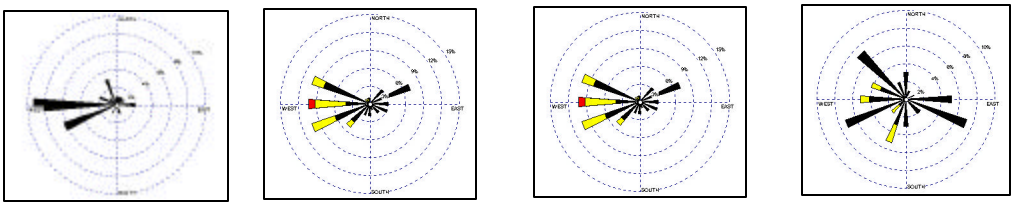
AGC	BLO	EDW	PNT

Date	*Lat*	*Long*	*Day Total*	*BLO*	*AGC*	*EDW*	*PNT*
9/28/01	34.913333	-120.399	500				
9/29/01	34.899167	-120.4988333	8,019				
9/30/01	34.899167	-120.4988333	4,046	4.55		6.08	2.69
10/1/01	34.918717	-120.4084667	3,525	0.24	0.90	0.38	1.98
10/2/01	34.918717	-120.4084667	14,955	0.52	1.16	0.68	1.85
10/3/01	34.918717	-120.4084667	4,565	0.24	0.48	0.22	1.43

The data from this period suggests that although there were a number of high usages to the south of EDW, these do not impact that site. The PNT data show impact from those areas, but EDW does not show a high impact. However, the highest values again occur during activity NW of BLO, which caused high levels at both BLO and EDW. AGC received its highest levels during this period, which were evidently due to the activity to the west of the area.

October 4-9, 2001





AGC	BLO	EDW	PNT

Date	*Lat*	*Long*	*Day Total*	*BLO*	*AGC*	*EDW*	*PNT*
10/4/01	34.918717	-120.4084667	5,312				
10/5/01	34.9226	-120.4153667	5,163				
10/6/01	34.918717	-120.4084667	4,350	0.58	0.08	0.36	0.82
10/7/01	34.9226	-120.4153667	14,338	0.52	0.21		0.93
10/8/01	34.899167	-120.4988333	3,618	0.21	0.17	0.26	0.21
10/9/01	34.899167	-120.4988333	6,768	1.04	0.39	0.82	2.26

The meteorology for this period was more varied than in general, with more westerly winds than normal. This tended to disperse the emissions throughout the area to some degree. However, the previously noted affected areas of BLO and EDW from the NW of BLO activity plus the central area all contributed to high values.

Regression Analysis

An exercise in regression analysis was performed to examine the relationship between the methyl bromide usage levels and ambient concentrations. Several approaches were considered in order to best understand the potential relationship between methyl bromide use and ambient concentrations. In particular, an analysis similar to that performed by DPR for the 2000 monitoring was performed in order to determine if that approach would yield useful information. The DPR analysis first attempted correlation with smaller geographic areas with poor results. The best correlation was obtained with a larger geographic area. A similar analysis for the current data set was performed by using all four sampling points averaged over time and space. The discussion presented above shows that the concentrations from the four sites are similar if not identical, so the spatial aspect suggests a good coverage.

The overall result of this regression analysis exercise casts doubt on the validity of the approach to express a quantitative relationship between the methyl bromide use and ambient air concentrations. While it is a simple observation that methyl bromide ambient concentrations are somewhat related to the amount of methyl bromide fumigation usage, a rigorous scientific quantitative relationship for policy purposes is more problematic. This conclusion was obtained by performing a number of data exploration analyses on the data. First, the day by day fumigant usage was plotted against the averaged daily ambient concentrations for those days on which both fumigations and ambient data were collected. The results for Oxnard/Camarillo are noted in Figure 18, and the results from Santa Maria are shown in Figure 19. These plots show no relationship between the daily uses and the ambient concentration.

However, it was recognized that the sample collection and usage may not correlate in time completely given that the sample date is the start date for the 24-hour collection and that the off-gassing from the fumigation continues for several days. Therefore, another analysis was conducted in which the date of sampling was used as the basis for combining fumigant usage over several days. For each date of sampling, the methyl bromide usage from the three previous days and one day after were combined into one value for the amount of methyl bromide that could have been the sources for off-gassing. These values were then compared to the average over the four sampling sites. This grouping was the same as used in the plots presented to visualize the ambient concentrations that would have resulted from fumigant usage.

The results are shown in Figures 20 and 21. On the surface, these figures suggest a much better correlation between the fumigant usage and ambient concentration. However, several considerations must be taken into account. First, one of the key assumptions in regression analysis has been violated—the independence of the data points.[17] This is termed autocorrelation, or serial correlation. In essence, the data points are related since the individual points that represent the phenomenon that is being tested for a relationship are interrelated in time and space. The off-gassing from one location continues over several days, and overlaps the emissions from another location close by. Both of these off-gassings contribute to the concentrations in the air that are being sampled. In addition, the samples being collected captured uneven times from each of the fumigations since they were not timed to start and stop simultaneously.

Furthermore, another closer examination of the data suggests that the regression line is severely affected by just one or two points. In the Oxnard/Camarillo data set, the two highest points are a factor of 2 and 4 greater than the other lower grouped levels, suggesting the possibility of outliers and an unequal weighting of those points to the curve. When these two highest points are removed from the regression, the correlation coefficient drops from 0.92 to 0.63. In addition, the slope is cut in more than half. These results are shown in Figure 21.

For Santa Maria, a similar exercise results in similar conclusions. Figures 22 and 23 show the full data set and then the data set with the main possible outlier excluded. In this case, the correlation coefficient drops from 0.82 to 0.36.

This analysis suggests that the data sets are not adequately robust for the formulation of a quantitative relationship between the two variables. There is a large body of statistical literature that cautions the application of a simple regression of one parameter versus the other and the inaccurate conclusions that could be drawn. These data sets appear to confirm the wisdom of those caveats.

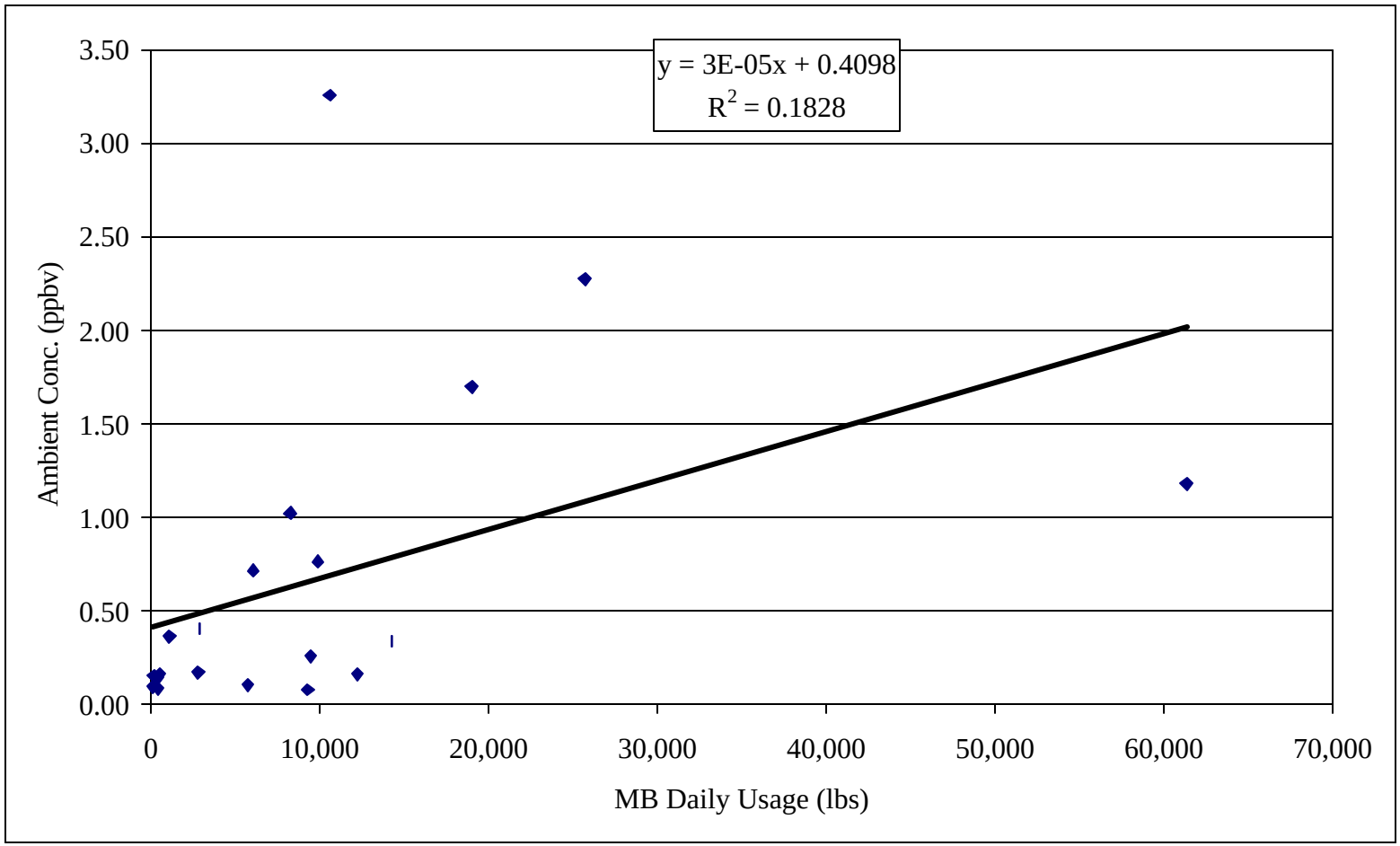


Figure 18. Daily Use Regression—Oxnard/Camarillo

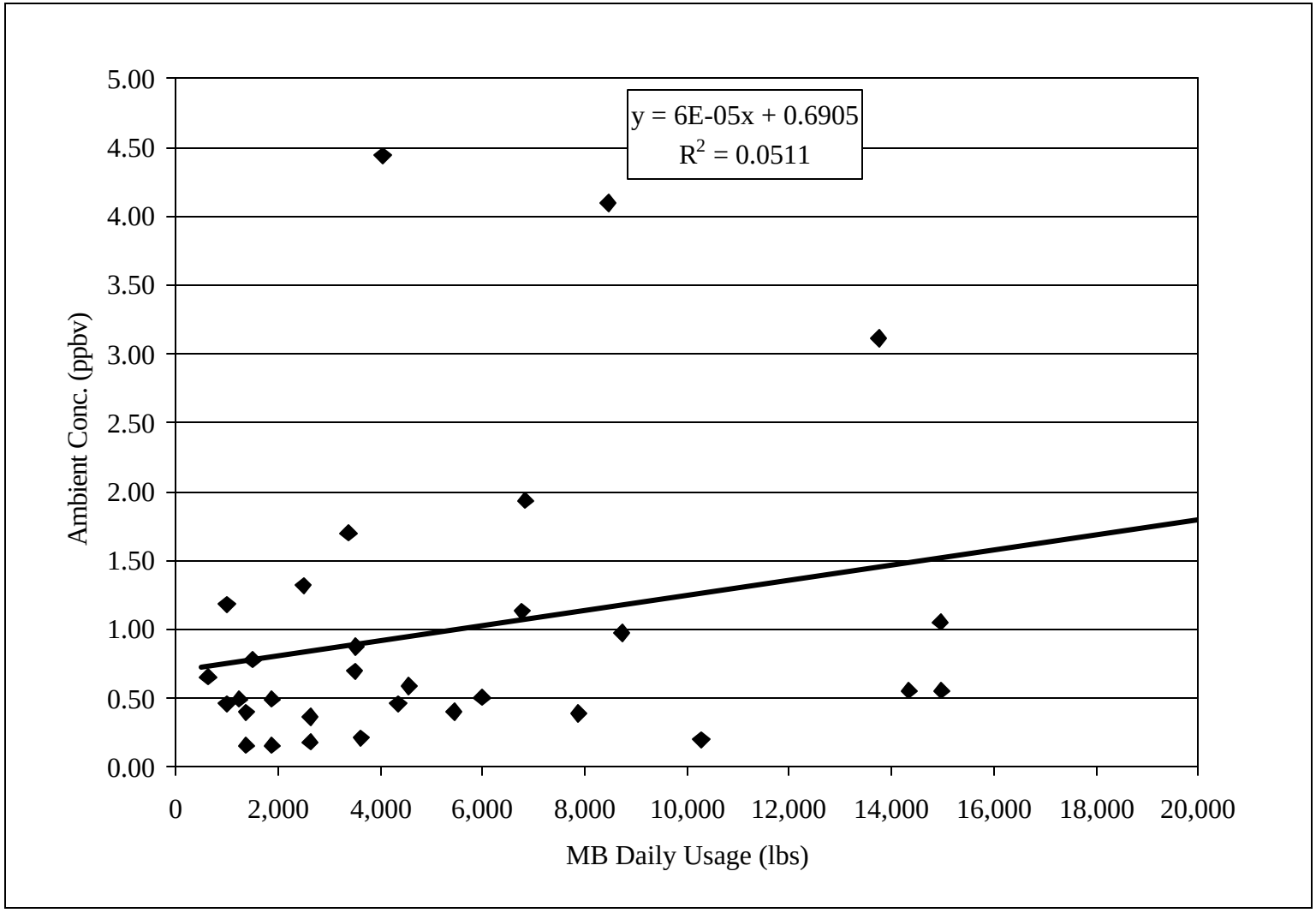


Figure 19. Daily Use Regression—Santa Maria

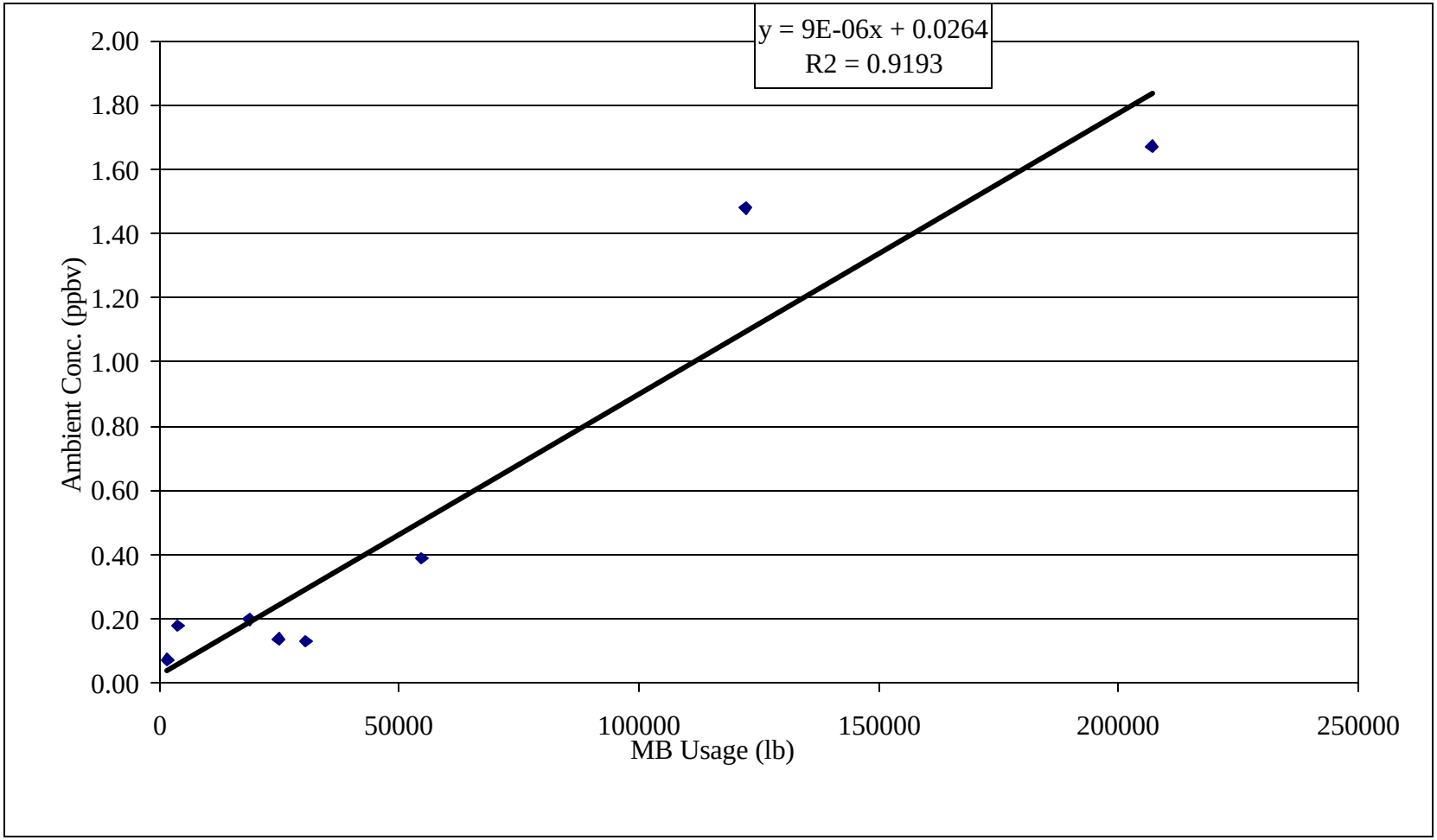


Figure 20. Oxnard/Camarillo Combined Data

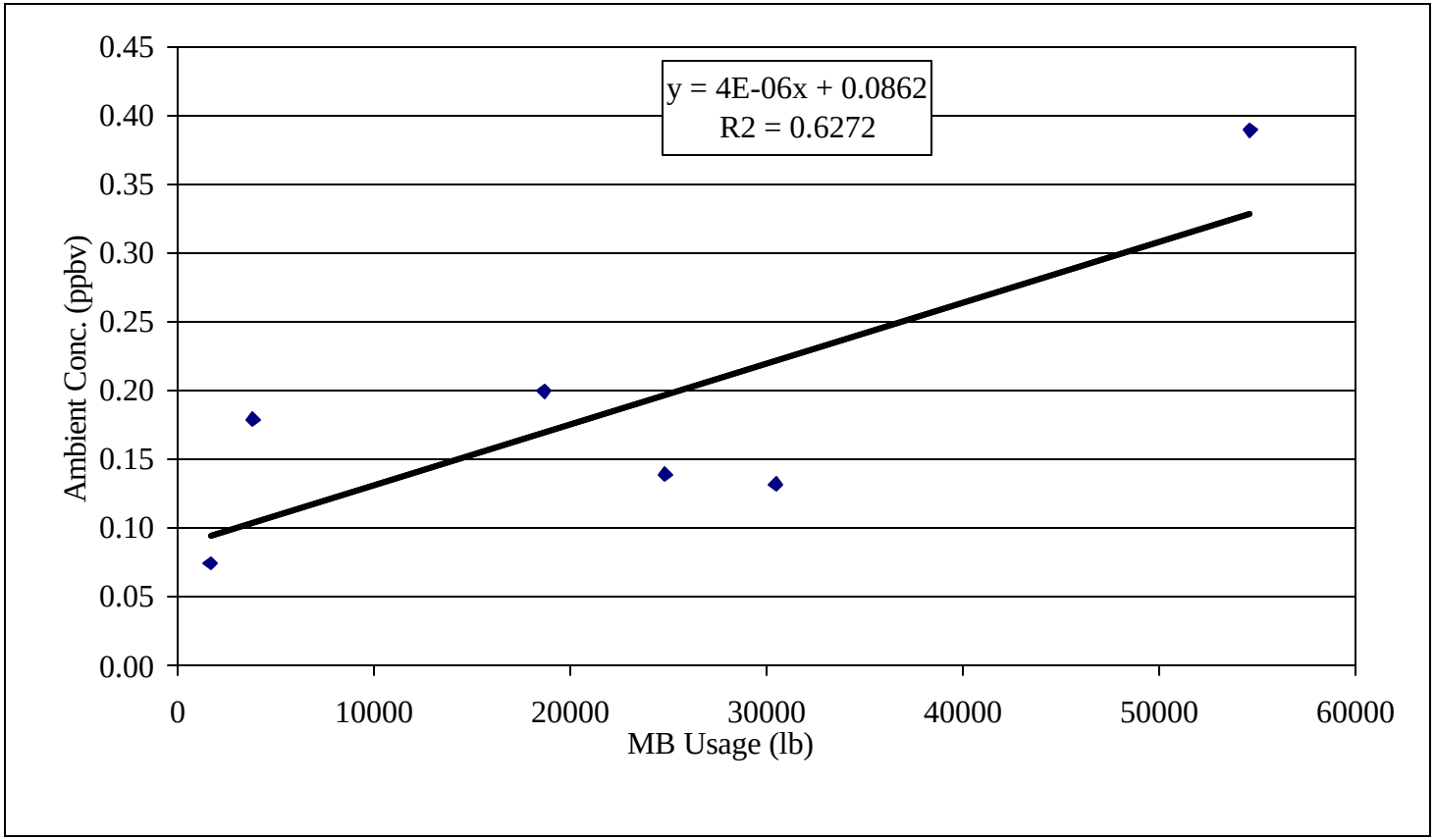


Figure 21. Oxnard/Camarillo Data without possible outliers

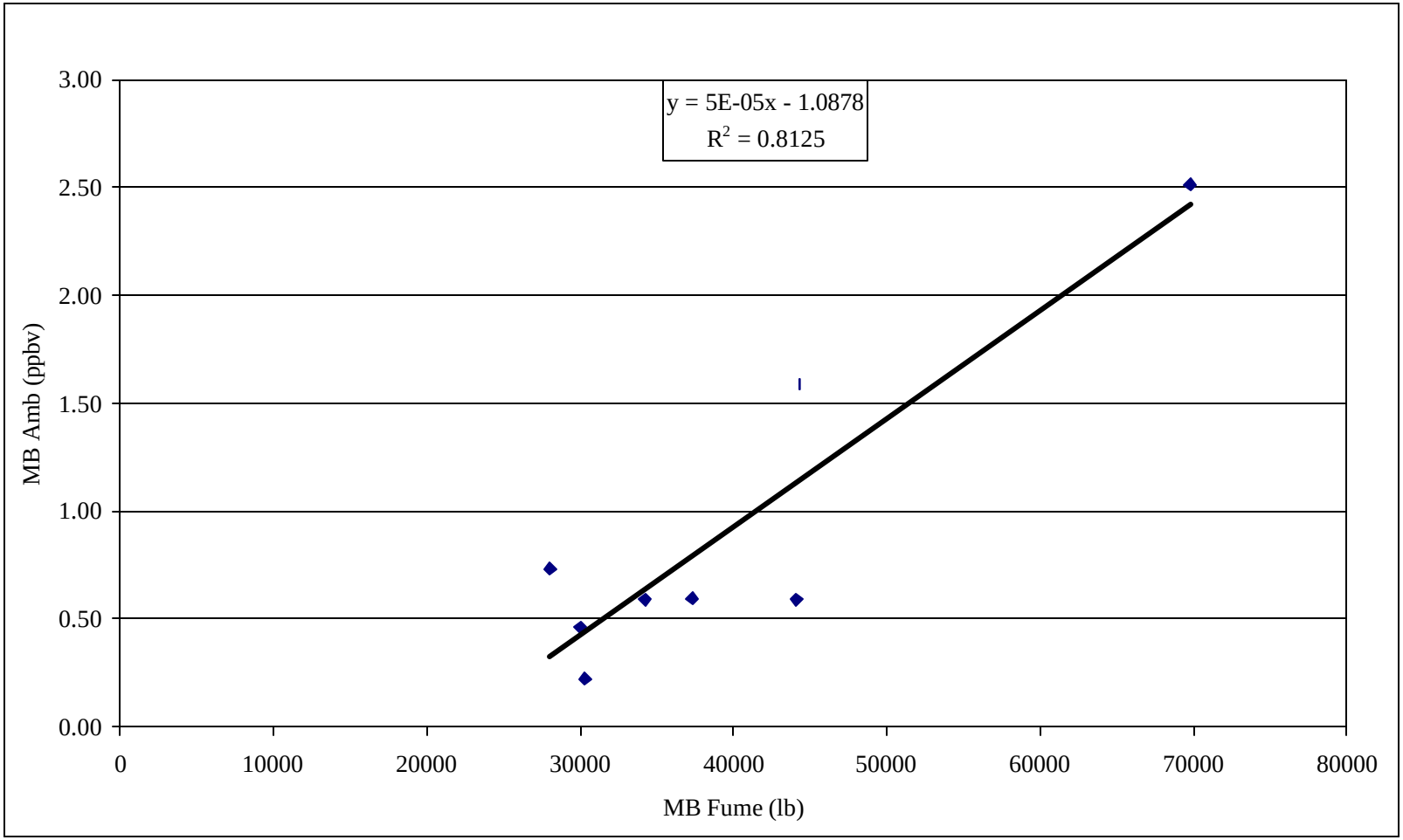


Figure 22. Santa Maria Combined Data

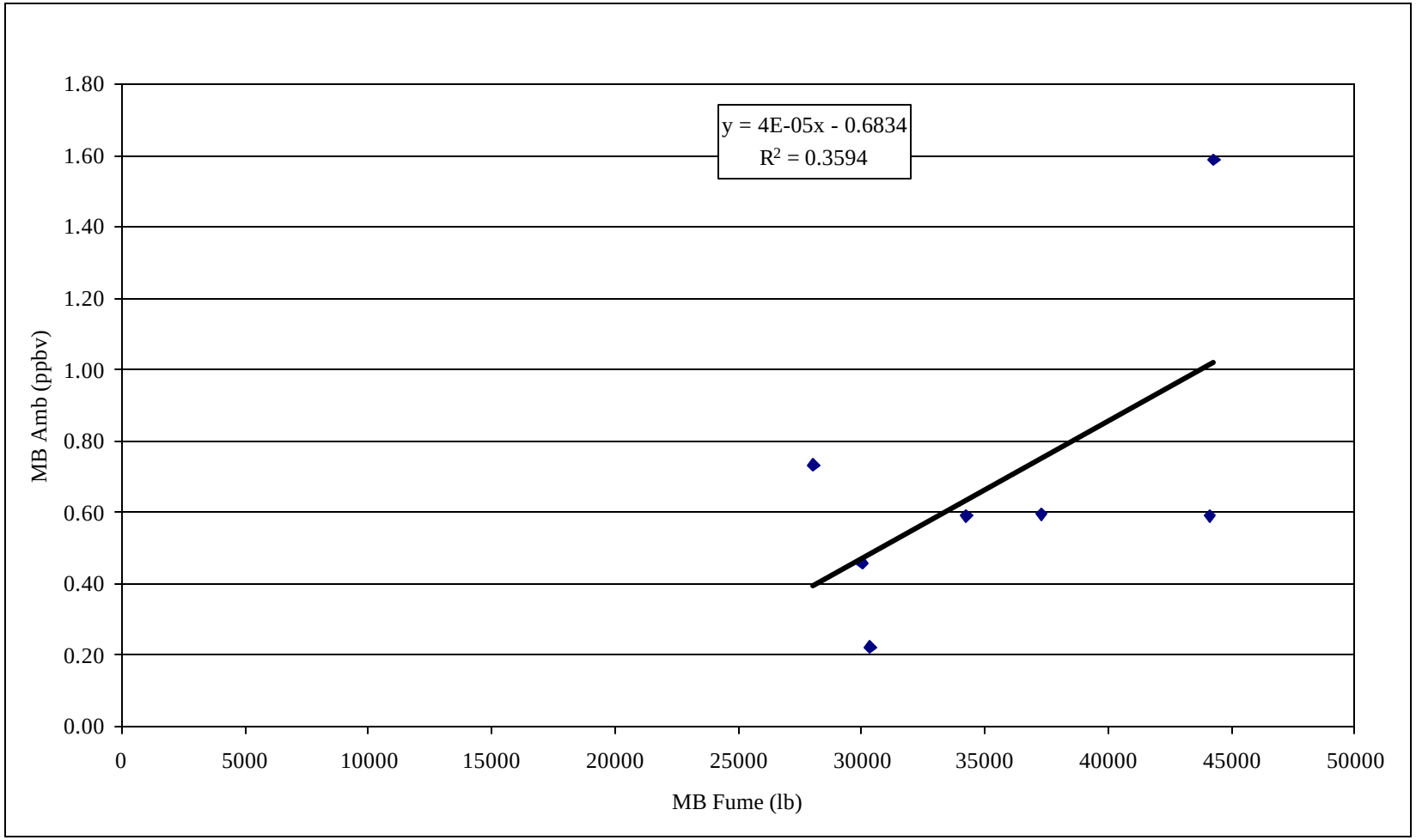


Figure 23. Santa Maria Combined Data without possible Outlier.

CONCLUSIONS

A review of the data collected in the Oxnard/Camarillo and Santa Maria areas shows an excellent agreement with intended quality assurance goals. The primary weakness was the poor performance of the flow controllers that caused a number of samples to be invalidated. Other samples were not collected due to the proximity of fumigation activity to the sampler. The range of quality assurance samples suggest a high degree of precision in both the laboratory and field operations. Although within normal bounds, the laboratory accuracy is biased slightly high.

While expected to be lognormal, the inherent nature of the Oxnard/Camarillo set was found to not well matched to any standard distribution. Therefore, nonparametric calculations were performed for the descriptive statistics for this data set. The Santa Maria data set was close to normal for the log-transformed data set, and therefore that set of data was transformed and parametric procedures used.

In Oxnard/Camarillo, the median concentration of ambient methyl bromide across all four sites and the entire eight-week study was 0.15 ppbv—less than the reference level of 1 ppbv. This detected level was below the reference level using both standard gaussian statistics as well as nonparametric statistics.

In Santa Maria, the lognormal average across all sites and the entire eight-week study was 0.42 ppbv—less than the reference level of 1 ppbv. Several samples appeared to have been possibly source-impacted, potentially raising the overall average.

The highest concentrations recorded in both Oxnard/Camarillo and Santa Maria appear to have been impacted directly by fumigations occurring close by. The magnitude of the concentration values at those sites during the heaviest fumigant usage nearby is not consistent with the general concentrations that occur when a large number of fumigations occur over a larger area.

Appendix—Field Data from Canisters

Oxnard Field Data

Date	Identification	Canister #	Flow #	Filter #	Start Time	Finish Time	Start Flow	Finish Flow	Start Press.	Finish Press.
8/15/2001	SHA081501	734	4	F1	3:15 PM	3:15 PM	3.0	3.2	-30	-7
	DVW081501	679	3	F6	1:40 PM	1:40 PM	2.9	3.1	-30	-8
	UWC081501	616	8	F21	2:10 PM	2:10 PM	3.0	3.3	-30	-6
8/16/2001	SHA081601	628	4	F1	3:50 PM	4:00 PM	3.0	3.1	-30	-8
	PVW081601	601	3	F6	2:00 PM	2:10 PM	2.9	3.5	-30	-5
	UWC081601	739	8	F21	3:00 PM	3:00 PM	3.2	2.8	-30	-10
8/17/2001	PVW081701	187	3	F6	2:00 PM	2:15 PM	3.1	3.1	-30	-8
	UWC081701	627	8	F21	3:00 PM	3:05 PM	2.9	3.5	-30	-5
	SHA081701	708	4	F3	4:00 PM	4:00 PM	3.0	3.3	-30	-6
8/21/2001	PVW082101	687	6	F3	9:30 AM	10:00 AM	3.0	3.1	-30	-8
	UWC082101	692	5	?	10:15 AM	10:30 AM	3.0	1.9	-30	-3
	SHA082101	647	4	F6	11AM	11:20 AM	3.0	0.0	-30	0
8/22/2001	PVW082201	753	2	F2	10:00 AM	9:30 AM	3.0	3.2	-30	-7
	UWC082201	180	33	F1	10:30 AM	10:10 AM	3.1	2.8	-27	-7
	SHA082201	730	3	?	11:20 AM	10:50 AM	3.1	2.2	-30	-14
8/23/2001	PVW082301	415	21	F8	9:30 AM	2:30 PM	3.0	3.1	-30	-8
	UWC082301	?	6	F3	10:10 AM	2:55 PM	3.0	3.1	-30	-8
	SHA082301	?	4	F6	10:50 AM	1:45 PM	3.0	2.2	-30	-14
8/24/2001	PVW082401	671	3	F5	2:30 PM	2:25 PM	2.7	0.8	-30	-2
	UWC082401	401	2	F2	2:55 PM	2:50 PM	2.5	1.9	-30	-14
	SHA082401	789	5	?	1:45 PM	1:45 PM	2.9	2.3	-30	-10
D	SHA082401D	790	33	F4	1:50 PM	1:45 PM	3.0	2.2	-30	-2
8/25/2001	SHA082501	726	6	F3	1:45 PM	2:00 PM	3.0	3.1	-30	-7
S	SHA082501S	677	4	F6	1:45 PM	2:00 PM	3.1	3.2	-30	-7
	PVW082501	761	13	?	2:25 PM	2:30 PM	3.0	3.3	-30	-6
	UWC082501	194	?	F8	2:50 PM	3:00 PM	3.2	3.5	-30	-5
8/28/2001	SHA082801	730	33	F4	11:45 AM	11:50 AM	2.8	2.1	-23	-8
	PVW082801	618	3	F5	12:15 PM	12:20 PM	2.8	2.6	-30	-11
	UWC082801	689	4	F6	12:40 PM	12:50 PM	3.1	3.3	-30	-6
8/29/2001	SHA082901	699	33	F4	11:50 AM	11:55 AM	2.9	3.1	-30	-8
	PVW082901	412	3	F5	12:20 PM	12:25 PM	3.2	2.6	-30	-11
	UWC082901	644	4	F6	12:50 PM	1:00 PM	2.9	3.3	-30	-6
8/30/2001	SHA083001	745	33	F4	11:55 AM	11:50 AM	2.9	2.4	-30	-13
	PVW083001	792	3	F5	12:25 PM	12:25 PM	3.1	2.9	-30	-9
	UWC083001	605	4	F6	1:00 PM	1:00 PM	3.0	3.3	-30	-6
	ABD083001	408	21	F8	2:30 PM	1:55 PM	3.1	2.6	-30	-11
8/31/2001	SHA083101	773	33	F4	11:50 AM	12:00 PM	3.2	2.4	-30	-13
	PVW083101	628	3	F5	12:25 PM	12:40 PM	3.1	2.6	-30	-11
D	PVW083101D	672	2	F2	12:25 PM	12:40 PM	3.1	2.6	-30	-11
	UWC083101	609	4	F6	1:00 PM	1:00 PM	3.1	3.1	-30	-8
S	UWC083101S	668	6	F3	1:00 PM	1:00 PM	3.0	1.6	-29	-3
	ABD083101	157	21	F8	1:35 PM	1:30 PM	3.1	2.6	-30	-11
9/6/2001	SHA090601	790	33	F4	10:00 AM	10:00 AM	3.0	3.0	-30	-8
	PVW090601	713	3	F5	10:45 AM	10:35 AM	2.9	2.5	-30	-13
	ABD090601	772	2	F2	11:35 AM	11:25 AM	3.0	3.0	-30	-11
9/7/2001	SHA090701	777	33	F4	10:10 AM	10:10 AM	3.1	2.8	-30	-8

	PVW090701	736	4	F6	10:30 AM	10:40 AM	3.0	2.6	-30	-8
	ABD090701	401	2	F2	11:25 AM	11:30 AM	3.2	3.1	-30	-11
9/8/2001	SHA090801	633	33	F4	10:15 AM	9:45 AM	3.0	2.9	-30	-10
	PVW090801	726	4	F6	10:45 AM	10:15 AM	3.0	0.5	-30	-8
S	ABD090801S	769	21	F8	11:25 AM	10:40 AM	3.0	2.9	-30	-14
	ABD090801	789	2	F2	11:40 AM	10:40 AM	3.2	3.1	-30	-14
9/9/2001	SHA090901	656	33	F4	9:40 AM	9:05 AM	3.0	2.8	-30	-9
	PVW090901	407	4	F6	10:10 AM	9:30 AM	3.0	1.5	-30	-9
	ABD090901	753	2	F2	10:45 AM	9:50 AM	3.2	2.5	-30	-10
D	ABD090901D	687	21	F8	10:45 AM	9:50 AM	2.9	2.6	-30	-12
9/13/2001	SHA091301	792	33	F4	3:35 PM	2:20 PM	3.1	2.8	-30	-10
	ABD091301	734	2	F2	4:05 PM	2:50 PM	3.1	3.1	-30	-8
	UWC091301	161	6	F3	4:40 PM	3:25 PM	3.1	3.6	-28	-2
	PVW091301	679	21	F8	5:10 PM	3:50 PM	3.1	2.6	-30	-11
9/14/2001	SHA091401	675	33	F4	2:25 PM	2:00 PM	3.2	3.2	-30	-9
	ABD091401	617	2	F2	2:55 PM	2:45 PM	2.9	3.0	-30	-10
	UWC091401	718	6	F3	3:15 PM	3:15 PM	3.0	0.3	-29	-1
	PVW091401	990	21	F8	3:25 PM	3:40 PM	3.0	3.1	-30	-9
9/15/2001	SHA091501	693	33	F4	2:05 PM	2:00 PM	3.1	2.8	-30	-9
	ABD091501	766	2	F2	2:55 PM	2:30 PM	3.1	3.0	-30	-12
	UWC091501	745	6	F3	3:15 PM	2:50 PM	3.0	0.3	-29	-2
	PVW091501	698	21	F8	3:45 PM	3:20 PM	3.1	3.0	-30	-9
9/16/2001	SHA091601	765	33	F4	2:05 PM	2:00 PM	3.1	3.1	-30	-10
	ABD091601	637	2	F2	2:35 PM	2:40 PM	3.1	3.0	-30	-16
	UWC091601	604	6	F3	2:55 PM	3:00 PM	2.9	0.4	-28	0
	PVW091601	668	21	F8	3:25 PM	3:35 PM	3.0	2.9	-30	-12
9/17/2001	SHA091701	648	33	F4	2:05 PM	2:30 PM	3.3	3.3	-30	-4
	ABD091701	667	2	F2	2:45 PM	3:00 PM	3.2	3.3	-30	-10
	UWC091701	186	6	F3	3:05 PM	3:25 PM	3.3	1.7	-30	-2
	PVW091701	178	21	F8	3:40 PM	3:40 PM	2.9	1.6	-24	-4
9/19/2001	PVW091901	602	21	F8	11:55 AM	9:20 AM	3.4	3.0	-30	-12
	UWC091901	738	3	F5	12:25 PM	9:35 AM	3.2	3.0	-30	-8
D	UWC091901D	190	4	F6	12:25 PM	9:35 AM	3.1	0.6	-30	-8
	ABD091901	713	2	F2	1:00 PM	10:00 AM	3.2	3.3	-30	-14
	SHA091901	731	33	F4	1:20 PM	10:15 AM	3.2	3.2	-30	-10
9/20/2001	PVW092001	689	21	F8	9:25 AM	9:00 AM	3.1	3.0	-30	-11
	UWC092001	660	3	F5	9:40 AM	9:40 AM	3.2	0.4	-30	0
	ABD092001	401	2	F2	10:00 AM	10:10 AM	3.3	2.9	-30	-10
	SHA092001	720	33	F4	10:20 AM	9:25 AM	3.1	3.2	-29	-4
S	PVW092001S	757	6	F6	9:25 AM	9:00 AM	3.1	2.4	-30	-10
D	SHA092001D	157	4	?	10:20 AM	9:25 AM	3.1	0.9	-30	-8
9/26/2001	PVW092601	777	21	F8	3:45 PM	3:50 PM	3.1	2.9	-30	-8
	ABD092601	170	2	F2	4:10 PM	4:15 PM	2.9	2.9	-30	-11
	SHA092601	772	33	F4	4:50 PM	5:10 PM	3.1	3.0	-30	-8
9/27/2001	PVW092701	167	21	F8	4:00 PM	4:50 PM	3.2	2.9	-30	-8
	ABD092701	780	2	F2	4:20 PM	5:30 PM	3.0	2.9	-30	-6
	SHA092701	790	33	F4	5:15 PM	6:25 PM	3.1	3.0	-30	-8
9/28/2001	PVW092801	694	21	F8	4:50 PM	4:40 PM	3.1	2.9	-30	-9
	PVW-1 WK	633	WK. LG.	N/A	N/A	N/A	N/A	N/A	-30	-2
	ABD092801	179	2	F2	5:30 PM	5:00 PM	3.3	2.9	-30	-12

	SHA092801	792	33	F4	6:25 PM	5:30 PM	3.1	3.0	-30	-9
9/29/2001	PVW092901	675	21	F8	4:45 PM	5:05 PM	2.8	2.9	-30	-9
D	PVW092901D	650	4	F6	4:45 PM	5:05 PM	3.2	0.4	-30	-9
	ABD092901	161	2	F2	5:05 PM	5:30 PM	3.2	2.9	-30	-6
	SHA092901	617	33	F4	5:35 PM	5:50 PM	3.2	3.2	-30	-8
9/30/2001	PVW093001	734	21	F8	5:10 PM	3:15 PM	3.0	3.1	-30	-12
	ABD093001	644	2	F2	5:35 PM	4:05 PM	3.2	3.0	-30	-12
D	ABD093001D	715	4	F6	5:35 PM	4:05 PM	3.1	0.7	-30	-8
	SHA093001	609	33	F4	5:55 PM	3:45 PM	3.1	3.1	-30	-11
10/7/2001	PVW100701	990	21	F8	10:45 AM	11:00 AM	3.6	3.1	-30	-9
	UWC100701	679	4	F6	11:15 AM	11:30 AM	3.1	2.8	-30	-7
	ABD100701	191	2	F2	11:40 AM	11:55 AM	3.3	3.2	-30	-12
	SHA100701	730	33	F4	12:15 PM	12:25 PM	3.3	3.0	-30	-10
10/8/2001	PVW100801	664	21	F8	11:05 AM	10:50 AM	3.3	3.0	-30	-9
	UWC100801	656	4	F6	11:30 AM	11:25 AM	3.1	2.4	-30	-8
D	UWC100801D	192	3	F5	11:30 AM	11:25 AM	3.5	1.9	-28	-6
	ABD100801	615	2	F2	11:55 AM	11:45 AM	3.2	2.9	-30	-12
	SHA100801	166	33	F4	12:25 PM	12:20 PM	3.2	0.1	-30	0
10/9/2001	PVW100901	758	21	F8	10:55 AM	10:05 AM	3.1	3.0	-30	-10
	UWC100901	726	4	F6	11:25 AM	10:30 AM	2.9	2.3	-30	-7
	ABD100901	186	2	F2	11:50 AM	11:00 AM	3.2	3.1	-30	-10
	SHA100901	653	33	F4	12:25 PM	11:35 AM	3.3	3.2	-30	-7
D	SHA100901D	175	3	F5	12:25 PM	11:35 AM	3.3	2.4	-28	-6
10/10/2001	PVW101001	718	21	F8	10:05 AM	9:00 AM	3.3	2.6	-30	-14
	UWC101001	689	4	F6	10:30 AM	9:25 AM	3.2	1.3	-30	-7
	ABD101001	401	2	F2	11:05 AM	9:55 AM	3.2	3.3	-30	-12
	SHA101001	784	33	F4	11:40 AM	10:25 AM	3.5	3.3	-27	-10
S	SHA101001S	713	3	F5	11:40 AM	10:25 AM	3.2	2.9	-30	-9

Santa Maria Field Data

Date	Identification	Canister #	Flow #	Filter #	Start Time	Finish Time	Start Flow	Finish Flow	Start Press.	Finish Press.
8/23/2001	BLO082301	772	617	F14	3:35 PM	4:00 PM	2.5	2.3	-29.5	-14
	AGC082301	777	618	F16	5:00 PM	5:00 PM	3.1	1.4	-30	-21
	EDW082301	713	42	F11	7:15 PM	6:20 PM	3.6	2.6	-30	-5
8/24/2001	PNT082401	407	22	F12	12:50 PM	3:15 PM	2.8	0.0	-28	-1
	BLO082401	736	18	F10	4:40 PM	2:00 PM	3.4	3.1	-29.5	-9
	AGC082401	633	25	F15	5:05 PM	2:35 PM	3.7	3.7	-29	-8
	EDW082401	769	31	F13	6:30 PM	3:50 PM	3.7	3.7	-29	-8
8/25/2001	BLO082501	817	617	F14	2:02 PM	2:46 PM	2.8	2.2	-30	-13
	AGC082501	751	618	F16	2:35 PM	3:15 PM	3.3	2.0	-30	-17
	PNT082501	653	51	F12	3:25 PM	3:40 PM	3.3	1.4	-30	-3
	EDW082501	169	42	F11	4:00 PM	4:20 PM	3.3	3.5	-30	-4
8/26/2001	BLO082601	761	18	F10	2:55 PM	12:15 PM	3.0	2.7	-30	-11
	AGC082601	173	25	F15	3:20 PM	1:05 PM	3.0	2.9	-30	-10
	PNT082601	711	22	F12	4:00 PM	2:10 PM	3.0	3.0	-30	-12
	EDW082601	710	42	F11	4:30 PM	3:35 PM	3.0	3.1	-30	-10
8/27/2001	BLO082701	756	18	F10	12:25 PM	11:35 AM	3.1	2.9	-30	-8
	AGC082701	661	25	F15	1:15 PM	12:10 PM	3.4	3.2	-29.5	-7
	PNT082701	675	22	F12	2:25 PM	1:15 PM	3.2	2.9	-30	-11
	EDW082701	980	42	F11	3:55 PM	2:00 PM	3.2	3.3	-30	-7
8/28/2001	BLO082801	214	18	F10	11:40 AM	12:20 PM	3.0	3.2	-30	-9
	AGC082801	951	25	F15	12:15 PM	1:30 PM	3.4	3.4	-29.5	-4
	PNT082801	627	22	F12	1:20 PM	3:30 PM	3.0	2.9	-26	-5
	EDW082801	765	42	F11	2:05 PM	4:05 PM	3.5	3.3	-29.5	-4
8/29/2001	BLO082901	715	18	F10	12:30 PM	11:50 AM	3.1	3.1	-29.5	-10
	AGC082901	191	25	F15	1:45 PM	1:00 PM	3.0	3.0	-29	-4
	PNT082901	754	22	F12	3:40 PM	1:45 PM	3.0	2.9	-30	-13
8/30/2001	BLO083001	739	18	F10	12:05 PM	11:20 AM	3.1	3.0	-30	-10
	AGC083001	601	25	F15	1:15 PM	12:20 PM	3.1	2.9	-30	-9
	PNT083001	990	22	F12	1:55 PM	1:15 PM	3.2	3.1	-30	-10
	EDW083001	608	42	F11	2:45 PM	1:45 PM	3.1	3.0	-30	-8
9/4/2001	EDW090401	413	42	F11	8:45 AM	8:45 AM	3.2	3.4	-30	-7
	PNT090401	188	18	F10	9:15 AM	9:25 AM	3.2	3.1	-30	-10
	AGC090401	181	22	F12	9:55 AM	9:55 AM	3.1	3.0	-30	-8
	BLO090401	189	25	F15	10:20 AM	10:35 AM	3.2	3.1	-30	-9
9/5/2001	EDW090501	174	42	F11	8:55 AM	8:50 AM	3.4	3.4	-29.5	-7
	PNT090501	697	18	F10	9:35 AM	9:20 AM	3.3	3.3	-30	-10
	AGC090501	616	22	F12	10:05 AM	9:41 AM	3.3	3.1	-30	-11
	BLO090501	631	25	F15	10:40 AM	10:10 AM	3.2	3.3	-30	-10
9/6/2001	EDW090601	817	42	F11	9:00 AM	9:10 AM	3.5	3.3	-29	-7
	PNT090601	761	18	F10	9:23 AM	9:30 AM	3.3	3.2	-30	-9
	AGC090601	173	22	F12	9:50 AM	9:55 AM	3.4	3.2	-30	-9
	BLO090601	751	25	F15	10:15 AM	10:45 AM	3.3	3.1	-30	-8
9/7/2001	EDW090701	194	42	F11	9:15 AM	9:00 AM	3.5	3.0	-26	-5
	PNT090701	647	18	F10	9:35 AM	9:15 AM	3.3	3.2	-30	-10
	AGC090701	169	22	F12	10:00 AM	9:40 AM	3.2	0.0	-30	-1
	BLO090701	180	25	F15	10:48 AM	9:55 AM	3.3	3.4	-30	-8
9/11/2001	EDW091101	739	22	F12	9:10 AM	8:40 AM	3.3	2.7	-30	-11

	PNT091101	661	18	F10	9:25 AM	9:30 AM	3.5	3.2	-30	-8
	AGC091101	644	25	F15	10:00 AM	10:05 AM	3.6	3.1	-30	-8
	BLO091101	730	42	F11	10:25 AM	10:48 AM	3.4	3.3	-30	-6
9/12/2001	EDW091201	715	22	F12	8:45 AM	8:53 AM	3.3	3.0	-30	-9
	PNT091201	415	18	F10	9:35 AM	9:40 AM	3.2	3.2	-29	-7
	AGC091201	671	25	F15	10:09 AM	10:15 AM	3.1	3.0	-30	-8
	BLO091201	627	42	F11	10:50 AM	10:50 AM	3.3	1.4	-28.5	-2
9/13/2001	EDW091301	609	22	F12	9:05 AM	8:20 AM	3.2	3.1	-29.5	-9
	PNT091301	749	18	F10	9:45 AM	8:50 AM	3.3	3.3	-30	-9
	AGC091301	951	25	F15	10:20 AM	9:30 AM	3.0	3.4	-30	-10
	BLO091301	412	42	F11	10:55 AM	10:00 AM	3.3	3.4	-30	-7
9/14/2001	EDW091401	980	22	F12	8:25 AM	8:50 AM	3.4	3.2	-29	-8
	PNT091401	601	18	F10	9:00 AM	9:15 AM	3.3	3.3	-30	-9
	AGC091401	191	25	F15	9:33 AM	9:40 AM	3.4	3.4	-30	-9
	BLO091401	626	42	F11	10:05 AM	10:00 AM	3.4	3.5	-30	-7
9/16/2001	EDW091601	180	42	F11	9:20 AM	9:15 AM	3.5	0.0	-30	-1
	PNT091601	188	22	F12	9:45 AM	9:55 AM	3.4	2.5	-30	-3
	AGC091601	616	18	F10	10:10 AM	10:25 AM	3.4	3.3	-30	-8
	BLO091601	177	25	F15	10:35 AM	10:55 AM	3.5	3.4	-30	-7
9/17/2001	EDW091701	754	42	F11	9:18 AM	9:20 AM	3.2	3.4	-30	-7
	PNT091701	189	22	F12	10:00 AM	9:43 AM	3.2	3.1	-30	-10
	AGC091701	408	18	F10	10:27 AM	10:10 AM	3.3	3.2	-30	-8
	BLO091701	413	25	F15	10:57 AM	10:45 AM	3.2	3.2	-30	-10
9/18/2001	EDW091801	631	42	F11	9:23 AM	9:03 AM	3.2	3.5	-30	-6
	PNT091801	712	22	F12	9:45 AM	9:30 AM	3.2	0.6	-30	-1
	AGC091801	697	18	F10	10:12 AM	10:00 AM	3.2	3.2	-29	-9
	BLO091801	194	25	F15	10:48 AM	10:34 AM	3.2	3.3	-30	-10
9/19/2001	EDW091901	717	42	F11	9:06 AM	9:05 AM	3.2	3.2	-30	-9
	PNT091901	700	22	F12	9:34 AM	9:39 AM	3.1	0.4	-30	-1
	AGC091901	757	31	F13	10:07 AM	10:20 AM	3.2	2.6	-30	-11
	BLO091901	655	25	F15	10:40 AM	10:55 AM	3.3	3.3	-30	-10
9/24/2001	BLO092401	714	22	F12	9:12 AM	8:55 AM	4.0	2.8	-30	-10
	AGC092401	638	25	F15	9:45 AM	9:35 AM	3.3	2.9	-30	-6
	PNT092401	412	42	F11	11:00 AM	10:45 AM	3.0	2.9	-30	-10
	EDW092401	739	18	F10	3:05 PM	11:50 AM	3.2	3.1	-28	-9
9/25/2001	BLO092501	600	22	F12	8:55 AM	8:55 AM	3.2	3.1	-30	-9
	AGC092501	708	25	F15	9:50 AM	9:37 AM	3.2	0.0	-30	-1
	PNT092501	690	42	F11	10:50 AM	10:10 AM	3.1	3.2	-30	-5
	PNT-1 WK.	736	INTGRA.		11:10 AM	11:40 AM (9/27/01)			-29	-8
	EDW092501	180	18	F10	11:59 AM	10:40 AM	3.0	3.1	-30	-10
9/26/2001	BLO092601	192	22	F12	9:10 AM	9:03 AM	3.4	3.0	-30	-9
	AGC092601	417	25	F15	9:41 AM	9:36 AM	3.2	0.0	-30	-1
	PNT092601	782	42	F11	10:15 AM	10:14 AM	3.3	3.2	-30	-6
	EDW092601	664	18	F10	10:43 AM	10:53 AM	3.0	3.0	-30	-10
9/27/2001	BLO092701	749	22	F12	9:07 AM	8:50 AM	3.1	3.0	-30	-10
	AGC092701	601	25	F15	9:42 AM	9:23 AM	3.0	3.1	-30	-8
	PNT092701	951	42	F11	10:19 AM	9:51 AM	3.3	3.3	-30	-5
	EDW092701	661	18	F10	10:56 AM	10:19 AM	3.0	3.0	-30	-10
9/30/2001	BLO093001	754	42	F11	9:30 AM	9:25 AM	3.3	3.8	-30	-8
	AGC093001	189	22	F12	10:00 AM	10:15 AM	3.1	0.0	-30	-1
	PNT093001	408	18	F10	10:41 AM	10:58 AM	3.0	1.8	-30	-3

	EDW093001	181	25	F15	11:43 AM	11:24 AM	3.0	3.2	-30	-10
10/1/2001	BLO100101	698	42	F11	9:28 AM	8:45 AM	3.2	3.6	-30	-8
	AGC100101	766	22	F12	10:21 AM	9:15 AM	3.2	2.8	-30	-11
	PNT100101	745	18	F10	11:04 AM	9:50 AM	3.2	0.0	-30	-1
	EDW100101	169	25	F15	11:25 AM	10:15 AM	3.1	3.0	-30	-11
10/2/2001	BLO100201	697	42	F11	8:50 AM	8:50 AM	3.1	3.3	-30	-8
	AGC100201	174	22	F12	9:16 AM	9:24 AM	3.2	2.7	-29	-7
	PNT100201	604	18	F10	9:54 AM	10:01 AM	3.3	3.1	-30	-9
	EDW100201	765	25	F15	10:17 AM	10:41 AM	3.0	3.3	-30	-7
10/3/2001	BLO100301	817	42	F11	8:54 AM	10:00 AM	3.3	3.5	-30	-6
	AGC100301	717	22	F12	9:26 AM	10:30 AM	3.0	3.2	-30	-7
	PNT100301	707	18	F10	10:09 AM	11:01 AM	3.1	3.3	-30	-8
	EDW100301	757	25	F15	10:43 AM	11:24 AM	3.3	3.4	-30	-8
10/6/2001	EDW100601	413	42	F11	8:57 AM	8:38 AM	3.2	3.4	-30	-9
	PNT100601	602	22	F12	9:48 AM	9:14 AM	3.2	3.0	-30	-10
	AGC100601	655	25	F15	10:38 AM	9:50 AM	3.2	2.9	-30	-9
	BLO100601	761	18	F10	11:37 AM	10:30 AM	3.4	3.4	-30	-10
10/7/2001	EDW100701	190	42	F11	8:44 AM	9:35 AM	3.2	0.8	-30	-3
	PNT100701	183	22	F12	9:20 AM	10:05 AM	3.1	3.0	-30	-8
	AGC100701	740	25	F15	9:50 AM	10:35 AM	3.2	3.4	-30	-6
	BLO100701	194	18	F10	10:21 AM	11:10 AM	3.3	3.4	-30	-6
10/8/2001	EDW100801	616	42	F11	9:40 AM	9:40 AM	3.2	2.9	-30	-10
	PNT100801	764	22	F12	10:10 AM	10:05 AM	3.1	2.9	-29	-9
	AGC100801	621	25	F15	10:35 AM	10:35 AM	3.4	3.3	-30	-7
	BLO100801	732	18	F10	11:15 AM	11:05 AM	3.4	3.3	-30	-8
10/9/2001	EDW100901	818	42	F11	9:43 AM	9:02 AM	3.1	3.2	-30	-9

References

[1] Brymer, David, LD Ogle, CJ Jones, DL Lewis, "Viability of using SUMMA Polished Canisters for the Collection and Storage of Parts per Billion by Volume Level Volatile Organics," Environ. Sci. Tech. 1996, 30, 188-195.

[2] McClenny, WA, JD Pleil, GF Evans, KD Oliver, MW Holdren, WT Winberry, "Canister-Based Method for Monitoring Toxic VOCs in Ambient Air," J. Air and Waste Management Assoc., **1991**, *41*, 1308-1318.

[3] Keith, L.H., ed. Principles of Environmental Sampling, Second Edition, American Chemical Society, 1996, page 430.

[4] USEPA, Guidance for Data Useability in Risk Assessment, Part A, EPA 9285.7-09A, April 1992, page. 106.

[5] USEPA, Quality Assurance Plan for the Air Toxics Monitoring Program, EPA-454/R-01-007, June, 2001.

[6] California Department of Pesticide Regulation Monitoring progress report, Appendix A, 2001. Obtained on CDPR web site.

[7] McClenny, WA, JD Pleil, GF Evans, KD Oliver, MW Holdren, WT Winberry, "Canister-Based Method for Monitoring Toxic VOCs in Ambient Air," J. Air and Waste Management Assoc., **1991**, *41*, 1308-1318.

[8] Evans, GF, TA Lumpkin; DL Smith; MC Somerville, J. Air Waste Management Assoc. **1992**, *42*, 1319-1323

[9] Compendium Method TO-14A, Determination of Volatile Organic Compounds (VOCs) in Ambient Air Using Specially Prepared Canisters with Subsequent Analysis by Gas Chromatography, EPA/625/R-96/010b, 1999.

[10] USEPA, Functional Guidelines for Organic Data Review, Office of Emergency Response, 1991.

[11] Gilbert, RO., Statistical Methods for Environmental Pollution Monitoring, Van Nostrand Reinhold, 1987.

[12] Minitab Program Statistical Guide.

[13] Berthoux, PM., Statistics for Environmental Engineers, Lewis: Boca Raton, 1994.

[14] Hollander, M., DA Wolfe, Nonparametric Statistical Methods, Wiley: New York, 1999.

[15] Massart, DL, et al. Handbook of Chemometrics and Qualimetrics, Elsevier: Amsterdam, 1997.

[16] Gilbert, RO., Statistical Methods for Environmental Pollution Monitoring, Van Nostrand Reinhold, 1987.

[17] Berthoux, PM., Statistics for Environmental Engineers, Lewis: Boca Raton, 1994